



Cruzane Mountain Project

Environmental Assessment

Forest Service



Superior Ranger District of the Lolo National Forest

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Introduction

We are proposing to implement commercial and non-commercial vegetation management, which includes fuel management treatments and site preparation and planting, on approximately 1,503 acres within the Cruzane Mountain project area. Additionally, we are proposing to complete prescribed burning on approximately 1,161 acres. Some of the areas included in the prescribed burning overlap with vegetation management units. These actions are proposed to be implemented on National Forest System lands on the Superior Ranger District of the Lolo National Forest.

We prepared this environmental assessment to determine whether to prepare an environmental impact statement or a finding of no significant impact.

Proposed Project Location

The Cruzane Mountain project area is located approximately 3 miles west of Haugen in Mineral County, Montana and just northeast of the community of Saltese (Figure 6). Cruzane Mountain is the dominant land feature and the project area is located between Interstate 90 and National Forest System Road 288. It is located within portions of two watersheds (HUC12 – 6th level), Packer Creek and Upper Saint Regis River. The southern boundary of the project area borders the St. Regis River. Two substantial streams (and their tributaries) which flow into the St. Regis River, Packer Creek (western boundary of project area) and McManus Creek (eastern boundary of the project area), encompass most of the project's drainage area. Additionally, a small portion of the Timber Creek drainage is present within the easternmost extent of the project area.

The project area covers approximately 3,790 acres within T19 R30 Sections 6, 7, 8, 17, 18, 19, and 20 and T19 R31 Sections 1, 2, 11, 12, 13, and 14 (Saltese and Haugan USGS Topographic Quadrangles). The majority of the project area is on National Forest System lands (3,347 acres or 88 percent) with approximately 443 acres on private lands (12 percent). No land management activities are being considered on these private lands.

Forest-wide goals included in the Lolo National Forest Plan, as well as those specific to management areas found within the project area, provide direction for this project and its development (U.S. Department of Agriculture 1986). These provide guidance to ensure that projects are developed to move areas towards the desired future conditions. No project can achieve all the goals outlined in the Forest Plan, but the proposed management activities were designed move the project area towards the desired future conditions described for the Management Areas within this area.

- Forest-wide management goals applicable to this project
 - Provide a sustained yield of timber and other outputs at a level that will help support the economic structure of local communities and provide for regional and national needs.
 - Provide habitat for viable populations of all indigenous wildlife species and for increasing populations of big-game animals.
 - Provide a pleasing and healthy environment, including clear air, clean water, and diverse ecosystems.
 - Meet or exceed State water quality standards.
- Management Area 13 (Riparian) goals
 - To manage riparian area to maintain and enhance their value for wildlife, recreation, fishery and aquatic habitat, and water quality.

- To provide opportunities to improve water quality, minimize erosion, and strengthen or protect streambanks through specifically prescribed vegetation manipulation and/or structural means.
- To provide opportunities to improve fisheries and wildlife habitat through specifically prescribed vegetation manipulation and/or structural means.
- Management Area 16 (Timber Management) goals
 - Provide for healthy stands of timber and optimize timber growing potential.
 - Develop equal distribution of age classes to optimize sustained timber production.
 - Provide for dispersed recreation opportunities, wildlife habitat, and livestock use.
 - Maintain water quality and stream stability.
- Management Area 24 (High visual sensitivity with varying degrees of timber management) goals
 - Achieve the visual quality objective of retention.
 - Provide for healthy stands of timber and optimize timber growing potential within the constraints imposed by Goal 1, while providing for dispersed recreation use opportunities, wildlife habitat, and livestock use.
- Management Area 25 (Medium degree of visual sensitivity with varying degrees of timber management) goals
 - Achieve the visual quality objective of partial retention.
 - Provide for healthy stands of timber and optimize timber growing potential within the constraints imposed by Goal 1, while providing for dispersed recreation opportunities, wildlife habitat, and livestock use.

Need for the Proposal

The purposes of the Cruzane Mountain project are to address past and current insect and disease impacts that have increased the risk of severe wildfire within the project area. In order to support a more healthy and resilient forest in the future, there is a need to manage forest species composition, improve the genetic quality of the forest, and address the increased amount of fuels that have accumulated in the project area as a result of forest health impacts and lack of fire activity.

Existing forest information from Regional V-Map data and local knowledge of the history of the Cruzane Mountain project area was used to understand management needs. V-Map products use remote sensing technology, and are based on a combination of airborne imagery and a nationally available digital topographic and climatic data. V-Map helps understand forest characteristics including 1) lifeform, 2) tree canopy cover class, 3) tree size class, and 4) tree dominance type can be mapped. This information can be used to support mid and base-level analysis and planning.

After a review of this information, as well as Forest Service personnel field surveys within the project area, this area is dominated by Douglas fir (Figure 1). This species is susceptible to multiple forest insects and disease, such as root rot, western spruce budworm, and Douglas fir beetle. Although large Douglas fir trees are resilient during wildfires, these large trees serve as a seed source, creating stands dominated by this species that are at risk for various impacts. High root rot mortality is already evident in these stands within the project area. Additionally, Douglas fir can persist in the understory as a shade tolerant species and act as a ladder fuel, increasing the risk of crown fires. Generally the dominance of Douglas fir within the project area is directly a result of long-term fire suppression. These characteristics create a need for management action.

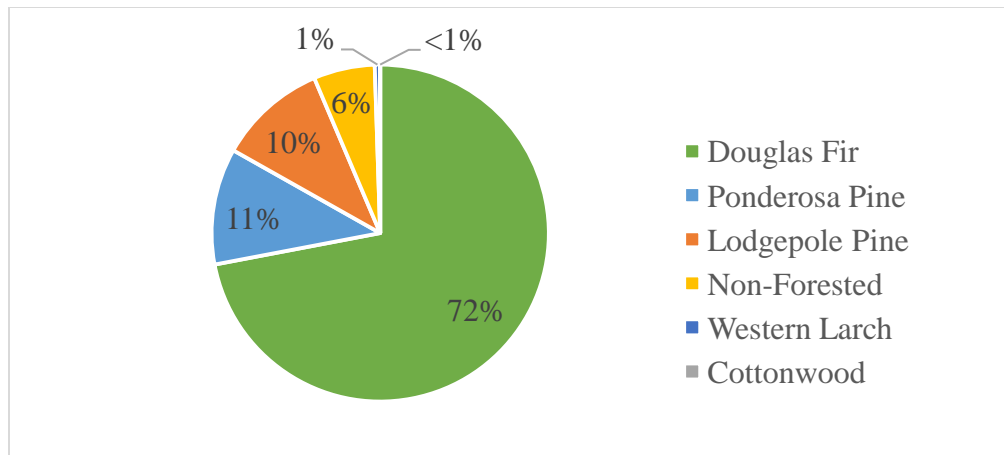


Figure 1. Forest species composition, based on 40 percent dominance within Region 1 V-Map data (05/2019).

Addressing these forest health issues will also enhance the safety of local residents and reduce the risk of catastrophic wildfire. If a wildfire were to occur within the project area, safety of firefighters responding and the efficiency getting into the area is also a concern because the Cruzane Mountain area does not currently have suitable access. Roads that exist within the project area are in need of maintenance to provide access and also to ensure their surface water management structures are sufficient to minimize degradation of water resources to nearby streams and aquatic habitat. Through the project-level transportation analysis, the interdisciplinary team determined several existing National Forest System roads are not needed for current or future management activities. Some roads pose risks to various resources, while others are important for forest management and wildfire response.

The project area is mostly within the wildland-urban interface and most of the project area is within 2 miles of the at-risk community of Saltese. Bounded by Interstate 90 to the south, the Cruzane Mountain area also has an increased number of potential ignition sources from the freeway. This area was included in the ‘West End’ portion of the county described in the Mineral County Wildfire Protection Plan (Mineral County Community Wildfire Protection Plan Steering Committee 2018).

Along with the previously described forest conditions and influences that create an urgency for management action, the collaborative group that developed the Wildfire Protection Plan also outlined challenges for wildfire management near West End communities such as Saltese. Several residential areas have one way in and one way out, which does not provide an escape route for firefighters in a wildfire event. Packer Creek Road (NFS Rd 288) is the only access for those residents with homes and properties on the northern side of the project area. The group identified limited water sources to support wildfire response for West End communities and difficulty recruiting volunteer firefighters.

Some background about the project area that contributed to the current forest conditions and wildfire risk:

- Fire has been actively suppressed in the project area for approximately 100 years. This has led to an increase of shade tolerant and intermediately tolerant tree species that are more susceptible to certain insects and disease. This species composition also creates a multiple story forest that is more prone to crown fires because ‘ladder fuels’ allow fire to more easily move from the understory into the overstory.



Figure 2. An example of multiple stories that can create higher risk for crown fires.

- There was extensive planting of off-site (not local) sapling tree stock following the 1910 and 1930 fires. While these trees have grown very quickly, they have proven more susceptible to insects and disease than native trees and are experiencing high mortality rates. Pathogens that are not normally lethal, such as needle casts, are affecting the health of these trees.
- There is currently high mortality due to mountain pine beetle within lodgepole pine stands visited during the early development of this project. These stands have experienced 50 to 70 percent mortality over the last 10-12 years. These impacts to forest health have created areas of extremely heavy fuel loads across Cruzane Mountain. Addressing fuel loading, as well as increasing species diversity and creating a mosaic distribution of stands of different size classes will promote landscape level mountain pine beetle resistance and long term forest health.



Figure 3. Examples of lodgepole pine stands that have experiences high mortality rates.

- Tree densities in ponderosa pine stands are at a level that makes them a ‘high risk’ for bark beetle impacts. This species is desirable to promote due to its resiliency to wildfire and long-lived characteristics.
- Stem decay and root disease (primarily *Armillaria* root rot) has been identified in stands dominated by Douglas fir and true firs. Douglas fir beetle is starting to increase the mortality in larger Douglas fir, especially those already affected by root rot.



Figure 4. An example of Douglas fir trees killed due to *Armillaria* root rot.

- Dwarf mistletoe is evident in western larch stands, impacting the growth and health of these typically long-lived and wildfire resilient trees.



Figure 5. An example of western larch stands affected by dwarf mistletoe.

- White pine blister rust has and continues to have a huge impact on the project area. It has severely reduced the amount of western white pine in the project area and increased the amount of shorter lived lodgepole pine and other species. Western white pine is desirable to retain and promote due to its resiliency to wildfire and long-lived characteristics.

- These forest management activities would provide timber and other forest products to help support local economies.

These needs and the existing conditions within the project area demonstrate a departure from the goals and desired future conditions provided in the Forest Plan. Below is a description of the proposed action to move the project area towards the desired future conditions.

Proposed Action

The Forest Service is proposing to use commercial and non-commercial vegetation management activities, as well as prescribed ecosystem maintenance burns and hand fuel treatments to meet the needs within the project area. Related activities, such as road management activities to support transporting forest products or address resource concerns identified during the transportation analysis process, are described below. Appendix A – Vegetation Management Unit Treatments Table includes details about each vegetation treatment unit proposed including yarding system, potential harvest operation system, regeneration type, site preparation for planting in regeneration units, post-harvest fuel management, associated large opening number, and associated subunit.

The proposed action was developed through the interdisciplinary team process involving Forest Service specialist covering a multitude of resource areas. Through this interdisciplinary team process, several project-specific design features and monitoring needs were identified and included as part of the proposed action (Appendix B – Applicable Forest Plan Standards for implementation, Project-specific Design Features, and Monitoring). These measures ensure compliance with Lolo Forest Plan (1986) direction and requirements, as well as laws, regulations, and policy applicable to the types of activities proposed within this project area. Monitoring specific to noxious weeds, detrimental soil disturbance, and smoke from prescribed burning activities was also included. This guidance would be carried out through implementation of proposed activities as included in Appendix B. Contributions from the public, partners, local, state, and other federal entities were considered during the proposal development process.

Commercial vegetation management activities

Both regeneration harvesting and intermediate treatments would be used to address the need to shift forest species composition to longer-lived, wildfire resilient and insect and disease resistant species (Figure 7, page 17; Table 1). These include ponderosa pine, western larch, and western white pine.

Table 1. Commercial vegetation treatments proposed for the Cruzane Mountain project.

Commercial Vegetation Treatment	Acres	Number of Units
Regeneration Harvest (includes shelterwood, seed tree, and clearcut with leave trees)	981.3	41
Commercial Thinning	417.4	19
Improvement Cut	12.7	1
Total	1,411.4	61

Regeneration harvests are a suite of cutting procedures that create a new age class by removing most trees from a stand. Three types of regeneration harvests are being considered within all regeneration harvest units to create a mosaic of harvest intensities to meet the needs in specific locations. These include: shelterwood, seed tree, and clearcut with leave trees. These harvest methods are proposed for just under

981.3 acres within 41 units. Each method depends on the forest species composition, biophysical setting, and management objective for that stand, as described below.

Shelterwood is a regeneration method used where a new age class develops beneath the moderated micro-environment provided by residual trees. This harvest method can produce a two-aged stand if sufficient reserve trees are retained. Generally, residual tree would be retained post-harvest for structure and snag recruitment. This harvesting method would be used in units where the objective of harvesting is to promote ponderosa pine on dry sites, leaving shelter trees onsite and removing trees affected by insect and disease, competition, or trees of lower wildfire resiliency.

Seedtree cuts are used where there are enough un-infected overstory trees of desirable species to provide a seed source for a new age class of trees. This harvest method can produce a two-aged stand if sufficient reserve trees are retained. Generally, the seed trees would remain post regeneration to provide structure and snag recruitment.

Clearcutting with leave trees is a regeneration method that would be used when insufficient trees of site-appropriate species exist to retain for either seed production or shelter for regeneration. In units where Douglas fir has high infections and/or mortality from *Armillaria* root rot, clearcutting would be used. Generally, leave or reserve trees would remain to provide structure and serve as snag recruitment. If sufficient reserve trees are retained, a two aged stand will result.

The Forest is seeking Regional Forester approval to harvest areas larger than 40 acres (Forest Service Manual Chapter 2470, Supplement No. R1 2400-2016-1, 2016). Forest Service Manual (FSM) 2470, Section 2471.1, Region 1 Supplement 2400-2016-1 generally limits the size of harvest openings to 40 acres or less. To exceed this size, Regional Forester approval is required except where natural catastrophic events (such as fire, windstorms, or insects and disease attacks) have occurred. Information on the location and size of these openings was revealed during scoping in June 2019 to initiate the 60-day public notice of this proposed management activity.

Considering the adjacency and type of harvesting proposed, there are 3 openings of regeneration harvesting that exceed 40 acres (Figure 8, page 18; Table 2). The objective of these larger regeneration units is to remove dead or dying trees being affected by various insect and disease impacts, as well as shade tolerant species that are less resistant to fire and insects and disease. These harvests would promote shade intolerant species that are longer-lived and resistant to these impacts.

Table 2. Large openings created from adjacent regeneration harvest units.

Large Opening ID	Total Number of acres	Number of Units included	Specific Units in each Large opening
1	217.0	9	27, 29, 31, 32, 50, 51, 52, 53, 65
2	443.7	14	1, 2, 3, 21, 22, 23, 24, 43, 44, 45, 46, 47, 48, 68
3	123	7	4, 7, 9, 10, 11, 14, 42
Total	783.7	30	

To ensure sufficient regeneration of the desired species following regeneration harvesting, many of the units harvested using regeneration methods would be prepared through either mechanical or underburning site preparation followed by planting a mix of ponderosa pine, western larch, and western white pine. This would occur on 33 of the units. Natural regeneration would be used in the remaining 10 units.

Commercial thinning is an intermediate treatment which reduces stand density of trees primarily to improve growth or enhance forest health. This is proposed on 417.4 acres within 19 units.

Improvement cuts are used to shift species composition and improve stand quality of the forest by removing less desirable trees species. One unit of approximately 12.7 acres is proposed for this treatment.

All commercial sized trees felled during logging operations would be whole tree yarded to designated landing sites to limb, cut to length, and load for transport. Remaining ladder fuels within the units would be felled followed by grapple piling and burning or underburning to treat fuels to an acceptable level.

Several yarding systems would be used dependent on the hillslope, resource concerns, and economic feasibility for various methods. These logging systems include ground-based operations (tractor or tethered logging systems), skyline, excaline, and high bank.

Proposed commercial vegetation treatments will occur in three subunits, grouping areas of treatment to ensure that wildlife that use the area are not directly impacted throughout the implementation of the project. The project area has been broken into three subunits: South, West, and East. The commercial thinning units that separate the west and east subunits could be implemented with either of these subunits to ensure most effective harvest operations (i.e. shared transportation routes, feasibility to implement).

Non-commercial vegetation management activities

Non-commercial forest management activities are also proposed to promote desired species within stands of smaller size classes and/or younger age. Forest management activities to address fuel loading concerns are also included. See Figure 7, page 17, and Table 3.

Pre-commercial thinning is an intermediate treatment in sapling stage stands used to improve composition, structure, condition, health, and growth of the residual stand. This treatment would also reduce fuel loading in these small diameter stands while promoting longer-lived desirable species. Pre-commercial thinning is proposed in 4 units covering approximately 77 acres. No mechanized equipment would be used.

Two areas, totaling approximately 15 acres, along Packer Creek are proposed for fuel break construction. This treatment would be similar to a ‘thinning from below’ where large trees would be retained and most of the understory is removed. This would decrease the wildfire risk and wildfire intensities along the main ingress/egress for residents and firefighters. There is also a benefit to plan these needed fuel breaks out in advance so that during the emergency response to a wildfire, there is more consideration for the various resource impacts. These treatments involve hand crews felling trees with chainsaws and hand piling the slash. No mechanized equipment would be used in these areas.

Table 3. Non-commercial vegetation treatments proposed for the Cruzane Mountain project.

Non-commercial vegetation treatment	Acres	Number of Units
Fuel Break	14.7	2
Pre-commercial thinning	77.0	4
Total	91.7	6

Road management activities

During early project development, a transportation analysis was completed to understand the benefits and risks of national forest system roads and undetermined roads within the project area. While this process

provided recommendations on road system management actions for the team and Responsible Official to consider, some adjustments specific to the proposed actions was necessary (Figure 9, page 19). As a result of the interdisciplinary process to consider the risk and benefits of the existing road system, several roads were identified as essential to carry out the proposed vegetation treatments as well as access to safely and efficiently respond in the case of a wildfire. Other roads or prisms within the project area were determined unnecessary to keep within the national forest transportation system. The tables below summarize the miles or linear feet of various road system management activities considered in this proposed action.

Road maintenance and reconstruction of existing national forest system roads is proposed for approximately 11 miles (Table 4). Routine maintenance includes surface water management, brushing, blading/grading, adding surface gravel, and any necessary dust abatement. Reconstruction is needed along existing National Forest System Road prisms that have not been accesses for several years and would require heavier equipment work to ensure they can provide sustainable access for project activities and future management needs. During these activities, culverts will be assess and any necessary work to address deficiencies would be completed to support project activities. Additionally, the road/stream crossing at McManus Creek on National Forest System Road 3831 (Cruzane Mountain) has been identified as a site where a temporary bridge may be used to access the units on the southern aspect of Cruzane Mountain because of the condition of existing culverts. After completing management activities that rely on this road, the temporary bridge and/or existing culverts would be removed and the road stream cross would be restored by removing material, reestablishing natural flow patterns, and potentially planting/transplanting riparian plant communities found at that location. Access to the upper ridge of Cruzane Mountain would be maintained from the extension of National Forest System Road 37104.

Construction of new national forest system roads is proposed for 4 miles. These new roads would provide long-term access needs into the project area. Engineering specifications would be used to layout these alignments and best management practices for road construction and long-term sustainability strategies would be integrated into implementation.

Two miles of existing roads would be placed in a storage status but would remain part of the national forest road system as intermittent storage status (Level 3SN in the tables below).

Additionally, 5.4 miles of existing national forest system roads would be decommissioned and removed from the road system (Table 5). Many of the roads proposed for 3DN level of treatment are not known to have corrugated metal pipes installed or the culverts were previously removed. Most have trees currently established within them. At this time, the appropriate level of treatment is allow them to continue to naturally decommission. During this field season, these road segments will be visited. In the case that pipes do exist and pose a risk to the watershed resources, the level of treatment they receive would be changed to reflect this need. The short segment of road proposed for 5D level of treatment is currently located adjacent or within an intermittent stream riparian area. Rather than reconstruct/maintain and use this segment of road, a temporary road in a more sustainable location has been proposed for access during implementation of one harvest unit. Both the existing road prism and temporary road would be decommissioned following project completion. Please see

Table 6 for descriptions of the level of treatment for these roads.

Road maintenance followed by decommissioning (Levels 3D, 3DN and 5D in the tables below) would occur on 2.6 miles of national forest system roads. These road segments are needed to carry out proposed activities, but would be decommissioned and removed from the national forest road system following project completion.

Table 4. Road management activities for the national forest road system proposed in the Cruzane Mountain project.

Road Management Activity	Miles	Linear Feet
Road Reconstruction - Existing system road	6.8	35,738.9
Road Maintenance - Existing system road	4.5	23,719.3
New Construction - Add to system	4.0	20,937.2
Existing System Road - Natural Storage (3SN)	2.0	10,511.6
Road Maintenance / followed by decommissioning (3D)	1.4	7,428.2
Road Maintenance / followed by decommissioning (3DN)	0.7	3,648.4
Road Maintenance / followed by decommissioning (5D)	0.6	2,913.6
Total	19.9	104,897.0

Table 5. National Forest System Road closures and decommissioning proposed in the Cruzane Mountain project.

Existing system roads to be closed/decommissioned	Miles	Linear Feet
Existing system road decommission/remove from system (3DN)	5.4	28,328.9
Existing system road decommission/remove from system (5D)	0.1	415.1
Total	5.5	28,744.0

Table 6. Road closure level descriptions for existing national forest system roads for the Cruzane Mountain project area.

Level	Typical Closure Device (Site specific situation dependent)	Typical Prism Treatment (All treatments are as-needed)
3-SN Natural Storage	Re-contour intersection (entrance obliteration) or rock/earth barrier as needed.	No physical or weed treatment needed; Naturally revegetated and stabilized.
3-DN Natural Decommission	Re-contour intersection (entrance obliteration) or rock/earth barrier as needed.	No physical or weed treatment needed; Naturally revegetated and stabilized.
3-D Decommission	Re-contour intersection (entrance obliteration) or rock/earth barrier as needed.	<ul style="list-style-type: none"> • Waterbar or outslope • Remove all corrugated metal pipes & restore watercourse • Scarify or rip upper 6-12", seed/fertilize as needed • Scatter slash on slopes, • Treat noxious weeds.
5 – Decommission	Re-contour	<ul style="list-style-type: none"> • Re-contour entire prism • Remove all corrugated metal pipes and restore watercourses • Seed and fertilize • Scatter slash on slopes • Treat noxious weeds

In addition, 4.4 miles of temporary roads would be needed to carry out commercial and non-commercial forest vegetation management activities (Table 7). Following completion of project activities, these temporary roads would be decommissioned according to contract specifications, which includes removing culverts, roadbed obliteration, applying slash or seeding/mulching as necessary, and ensuring these prisms return to productivity.

Please note that no change in public motorized access into the project area is proposed at this time and that ensuring access restrictions through closure methods (such as gates or other barriers) would be maintained or improved through road management activities. During proposal development, the interdisciplinary team determined that winter logging is not required to implement this proposed action due to soil conditions and avoidance of operations in areas (i.e. wet or saturated areas) that would make winter operations necessary, therefore there will be no impact to winter recreation opportunities along this snowmobile route.

Table 7. Temporary roads to be used and decommissioned following proposed vegetation management activities.

Temporary Roads	Miles	Linear Feet
Temp Road - Decommission after use	4.4	23,255.9

Ecosystem maintenance burns

Two areas of prescribed burning, or ecosystem maintenance burns, are proposed to re-introduce fire as a management tool within the project area (Figure 10, page 20; Table 8. Ecosystem maintenance burns proposed in the Cruzane Mountain project. Table 8). These prescribed burns would occur after harvesting to accomplish multiple objectives: 1) reduce slash from logging operations, 2) reduce hazardous natural fuels, 3) regenerate browse for big game winter range, and 4) reduce conifer encroachment within existing open areas.

Natural barriers (ridges and draws) would be used for the majority of the control lines. Hand fireline would be needed along the private property on the western boundary of LS2. The prescribed burns would be conducted at the landscape level which would treat both the harvest units and the unharvested portions of the burn block. This would create a mosaic burn pattern with varying levels of fire intensity which reduces and breaks up the continuity of the hazardous fuels.

Table 8. Ecosystem maintenance burns proposed in the Cruzane Mountain project.

Unit	Acres
LS1	40
LS2	1,041
LS3	80
Total	1,161

Prescribed fire and pile burning would follow the plans, policies, and consider the use of appropriate project design criteria measures for smoke management. An approved Prescribed Fire Plan would be completed and adhered to for prescribed fire operations and pile burning. As a member of the Montana/Idaho Airshed Group, the Forest Service will submit all prescribed burn requests from this project through the Smoke Monitoring Unit for approval, in accordance with procedures outlined in the MT/ID Airshed Group Operating Guide (Montana Department of Environmental Quality 2010). The Forest Service will operate underneath the permits defined by the Department of Environmental Quality,

coordinate with Regional and Smoke Coordinators, submit spot weather forecasts, and make appropriate public notifications. In compliance with Administrative Rules of Montana (ARM) 17.8.610, the Forest Service obtains a major open burning permit annually from the State and agrees to utilize Best Available Control Technology, as defined in ARM 17.8.601(1), and observe the requirements of the open burning permit.

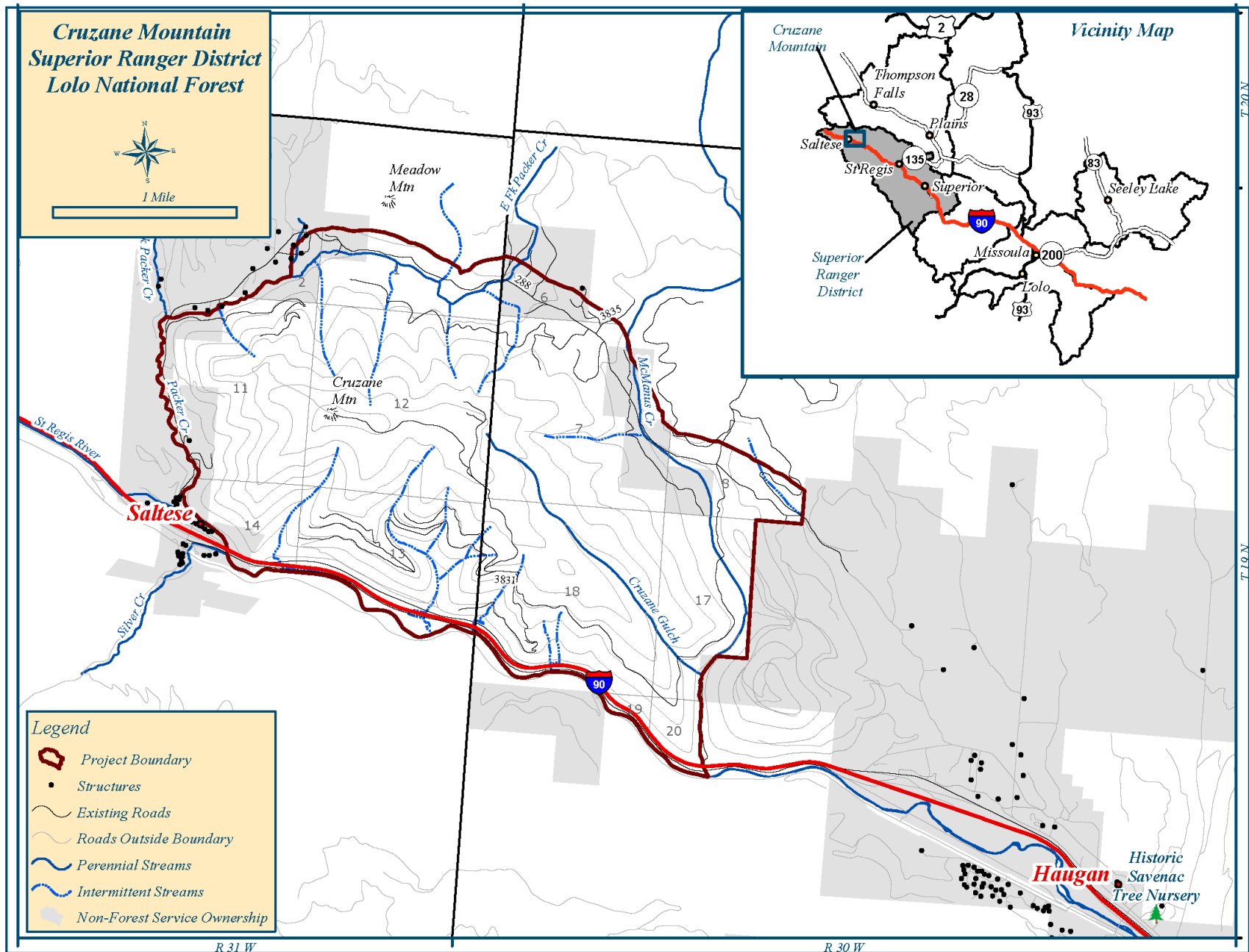


Figure 6. Cruzane Mountain Project Area, Vicinity Map.

Cruzane Mountain Project Proposed Action (08/30/2019) Vegetation Treatments and Road Management Activities

Superior Ranger District Lolo National Forest



Disclaimer:
The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. Data may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results.

The Forest Service reserves the right to correct, update, modify, or replace, GIS products without notification.



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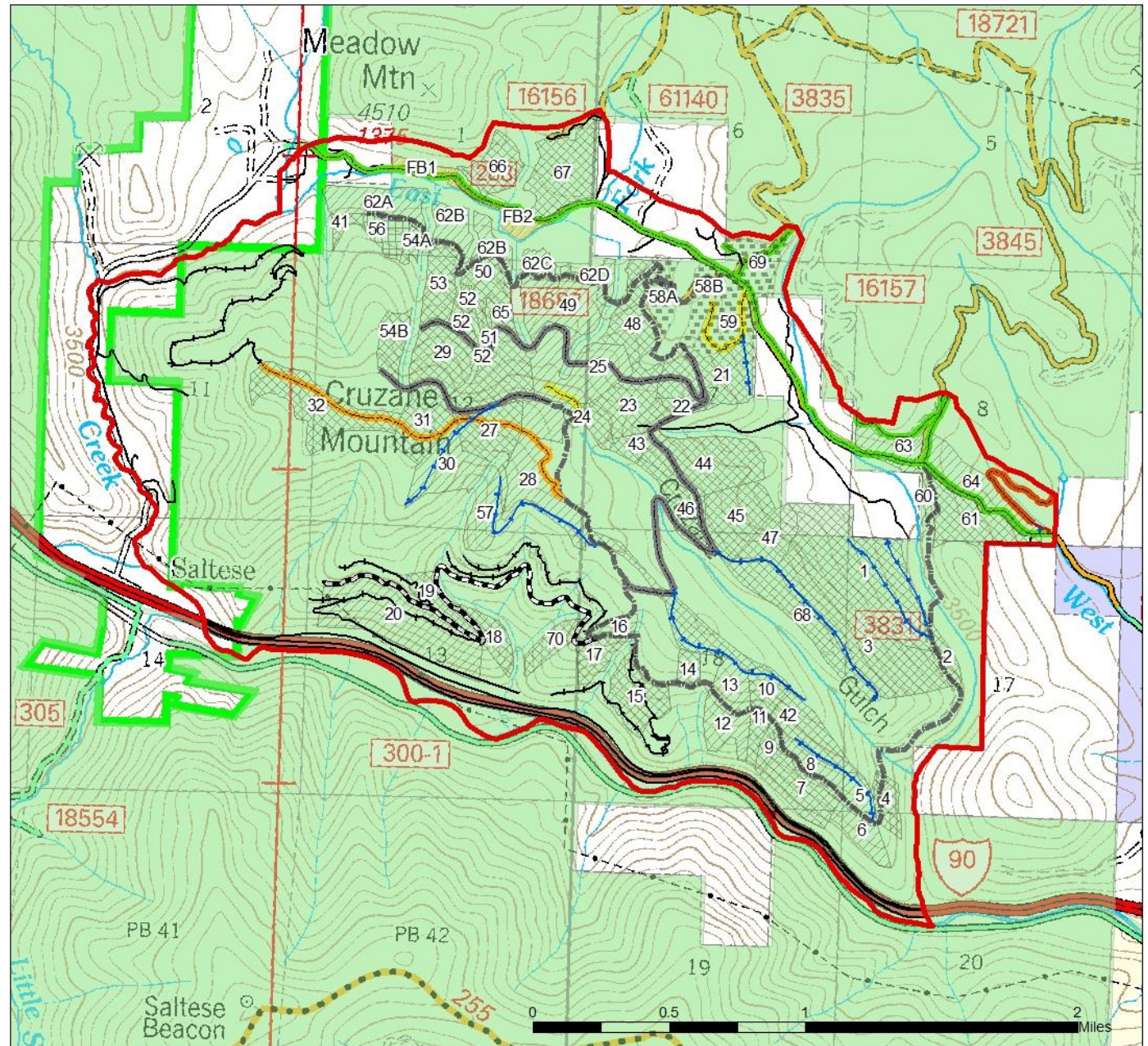
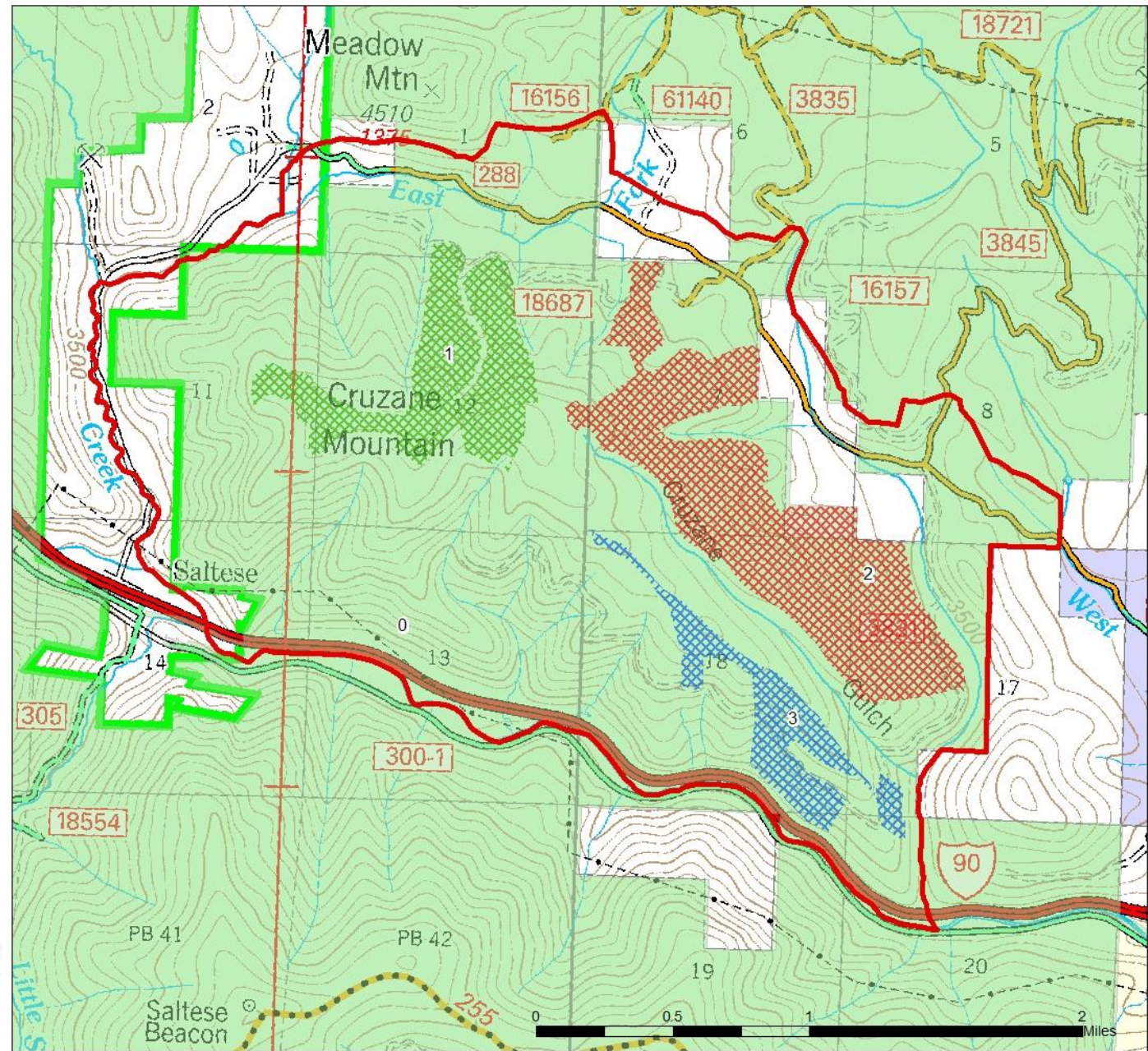


Figure 7. Cruzane Mountain Proposed Action: Vegetation Management Activities.

**Superior Ranger District
Lolo National Forest**

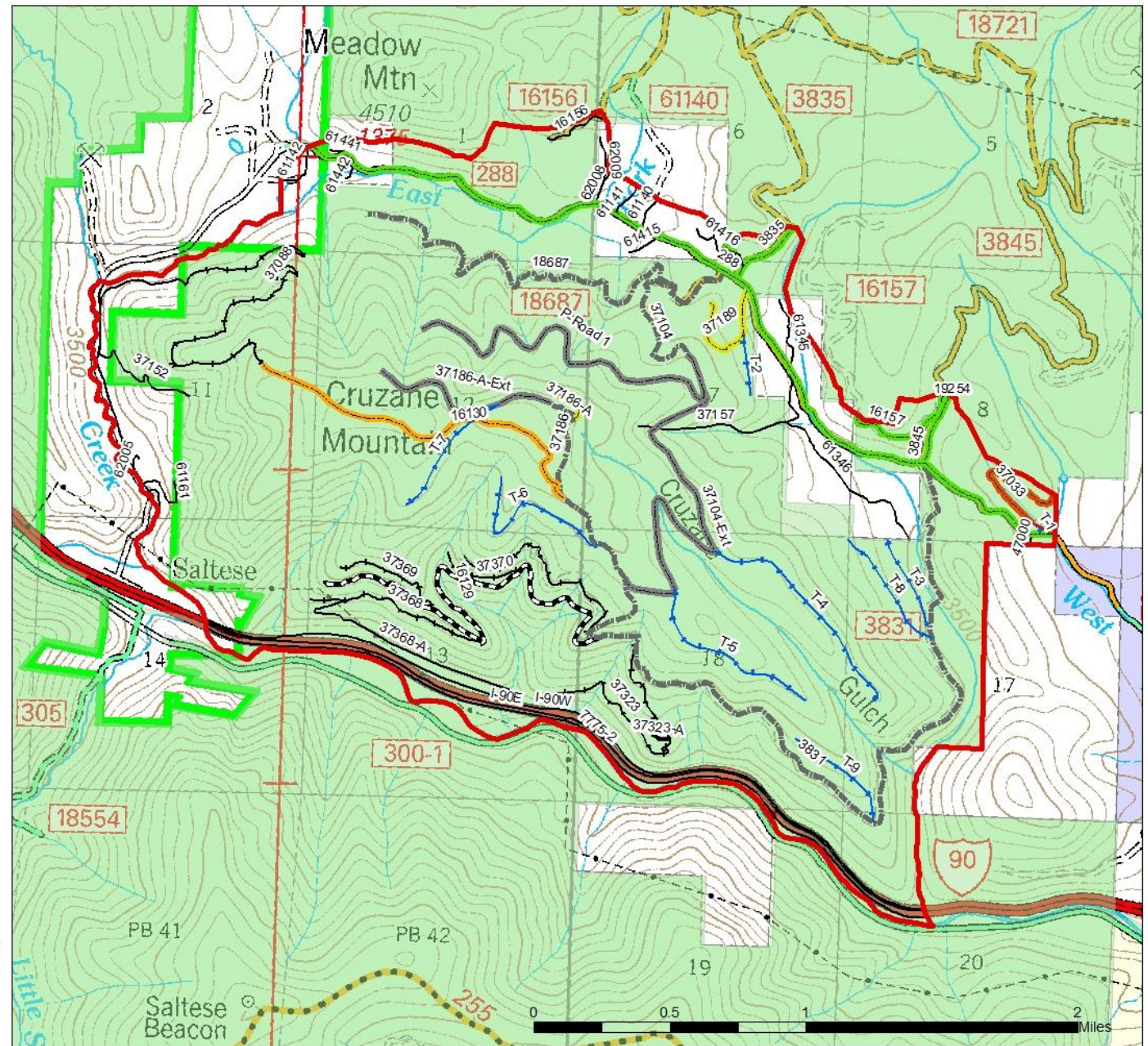
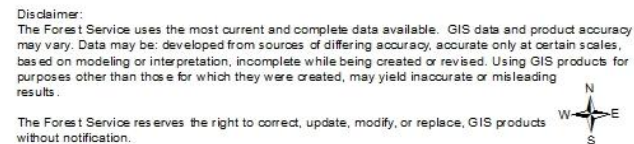


The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification.

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Figure 8. Cruzane Mountain Proposed Action: Large Openings created from regeneration harvesting.

**Superior Ranger District
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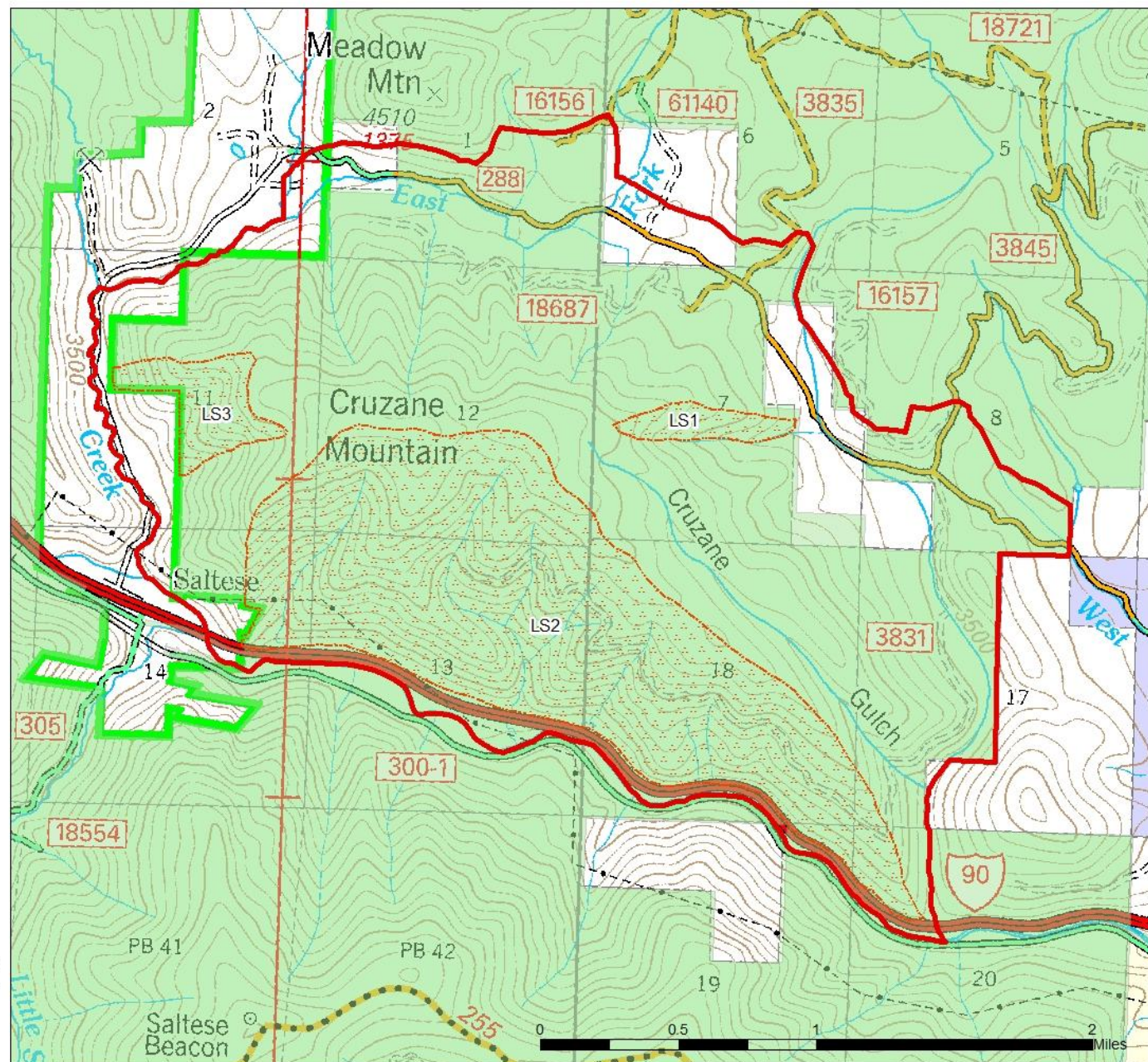
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Figure 9. Cruzane Mountain Proposed Action: Road Management Activities.

**Cruzane Mountain Project
Proposed Action (08/30/2019)
Ecosystem Management Burn Activities**

**Superior Ranger District
Lolo National Forest**

- Project Area Boundary
- Ecosystem Management Burns



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Figure 10. Cruzane Mountain Proposed Action - Ecosystem Maintenance Burns.

Environmental Impacts

This section of the Environmental Assessment discloses the impacts of the proposed action on various environmental and social resources to provide the public and the responsible official with an understanding of the anticipated outcomes of land management activities to determine if a Finding of No Significant Impact can be supported based on the context and intensity of those effects.

Past, present, and reasonably foreseeable actions considered during cumulative effects analysis varied by resource area. All activities included are summarized in Table 9. The past actions summary is not necessarily exhaustive, as records may not exist for all past activities by project. This is particularly true for those actions that predate the passage of the National Environmental Policy Act in 1970. Nonetheless, the effects of such past actions are accounted for in the assessment of the existing condition, as the current condition assessment necessarily reflects any relevant impacts of such actions. It is important to note that separate activities may have occurred on the same acreage over time.

Table 9. Summary of past, present, and reasonably foreseeable future activities.

	Activity & Description	Location	Active Years	Acres or Miles affected	Past	Present	Reasonably Foreseeable
Activities on all lands							
1.	Insect and disease impacts to forest health	Project area	On-going	3790 acres	X	X	X
2.	Increased risk of severe wildfire	Project area	On-going	3790 acres	X	X	X
Activities on NFS Lands							
3.	Outfitter and Guide Special Use Permits	Various locations near/within the project area	On-going	varies	X	X	X
4.	Snowmobile use during the winter	Sections of NFS Rd 3835, 3845, and 288	On-going	Approx. 4 miles	X	X	X
5.	Herbicide application for non-native invasive plants (weeds/invasive plants)	Various locations throughout the project area	2009, 2010, 2011, 2014, ongoing	66 acres in the past, variable treatment on-going based on district priorities	X	X	X
6.	Pre-commercial thinning and pruning	Various locations throughout the project area	1966, 1973-76, 2010, 2017	97 acres	X		
7.	Past commercial harvesting (includes commercial thin, liberation cut, salvage cut – intermediate, seed-	Various locations throughout the project area	1965, 1968, 1974-76, 1978, 1988, 1990	1,234 acres	X		

	tree seed cut, Shelterwood establishment cut, single tree selections cut, and stand clearcut						
8.	Historic tree planting of off-site stock following historic fires	Various locations throughout the project area	1910, 1914, 1944	Approx. 270 acres	X		
9.	Mechanical site prep for planting or to promote natural regeneration	Various locations throughout the project area	1976, 1990	41 acres	X		X
10.	Tree planting	Various locations throughout the project area	1982, 1991	Approx. 8 acres	X		
11.	Broadcast burning, Underburning (low intensity), Burning for site preparation for planting, Pile burning	Various locations throughout the project area	1975-1999, 2015	Between 552-600 acres	X		X
12.	Wildfires (more recent)	Various locations	1980-2019	Approx. 2 acres	X		X
13.	Wildlife habitat activities	One unit within the project area	1975	6 acres	X		X
14.	NFS Road Construction/Maintenance and associated road/stream crossings	Various locations throughout the project area	On-going	15 miles	X	X	X
15.	Road decommissioning	Segments of NFS Rds 37152, 37157, 37368-A	1990s	Approx. 2 miles (past activity – does not include proposed action)	X		
16.	Waterhole claims – Uranium mining exploration	One location within the project area	1950s	n/a	X		
Activities on adjacent lands							
17.	County Road Maintenance and associated weed spraying	Adjacent to project area along NFS road 288	On-going	Approx. 4 miles directly adjacent	X	X	X
18.	Interstate 90 (ignition sources, high use,	Adjacent to project area on	On-going	Approx. 3 miles directly	X	X	X

	maintenance)	the Southeastern boundary		adjacent			
19.	Private land development and management (roads/access, infrastructure, etc)	Varies	On-going	Undetermined	X	X	X
20.	West Fork Timber Creek harvesting (State land)	Varies	On-going	Undetermined		X	X

Proposed Action

Due to the absence of effects to some resources, an in-depth analysis of impacts was not included in this environmental assessment. This includes recreation resources (national forest system trails, developed and dispersed recreation sites), Candidate/Federally-listed and Regionally Sensitive Plant Species, carbon cycling/storage, and Heritage/Cultural Resources.

- Although National Forest System Road 288 is used as a snowmobile route when conditions can support those uses, no proposed management activities are planned for winter season implementation and no conflicts with this recreational use are anticipated. No other developed recreation resource within the project area, therefore, no direct/indirect or cumulative effects would result by implementing the proposed action. There are no designated national recreation areas or trails, nor any congressionally designated wilderness areas, within the project area. No inventoried roadless areas or research natural areas exist within the project area.
- Although potential habitat assessments, field surveys and a biological evaluation were prepared for federally-listed (endangered, threatened, or proposed) and regionally sensitive plants, none occur within the project area, therefore no direct/indirect or cumulative effects are anticipated by implementing the proposed action. A biological evaluation is included in the project file.
- An assessment of the effects to carbon cycling and storage was completed and is included in the project file. In summary, the analysis showed that the proposed action would not have a measurable impact on carbon stocks in either the short or long term, because the area of treatment is a small fraction relative to regional and global carbon stocks.
- The proposed action will have no adverse direct or indirect effects to protected and known cultural resources. The Heritage program gathered information working with the implementation staff to establish practical Protection Measures for each site and its features that protect the resource as well as is feasible during implementation which was submitted to SHPO for review. Concurrence has been provided by Montana State Historic Preservation Office (SHPO) and consultation has occurred with the Confederated Salish and Kootenai Tribes. The cultural sites will be avoided through project design and/or resource protection measures. Monitoring will be necessary of known sites prior to and following project activities where known site exist is incorporated into the proposed action, as well as the standard procedures of halting project implementation if an unknown site is located and coordinating with Heritage program staff (see Appendix B). A cultural resources report is included in the project file.

Forest Vegetation

This section discloses the impacts of the proposed action on forest vegetation focusing on forest structure, resiliency of tree species to various natural impacts, and genetic composition. Additional information about methodology, data sources, and other information supporting the conclusions summarized here can be found in the project file.

To understand the effects of the proposed action on forest vegetation, resource indicators and their measure associated with these characteristics that are sensitive to change help describe anticipated changes to forest vegetation (Table 10). These are derived from the project purpose and need and public input, and are bound by laws, regulations, and policies.

Table 10. Resource elements, indicators, and measures used to describe the effects to forest vegetation.

Resource Element	Resource Indicator	Measure
Forest Structure	Tree density	Trees per acre
		Basal area
	Size class distribution	Quadratic mean diameter
	Number of stories	Number
Resilient Species	Species composition	% of early seral species
Genetic makeup	Genetic component	% off-site trees present

Density is defined by trees per acre and/or basal area (BA). Basal Area is defined as the cross sectional area of all trees measured at diameter at breast height (DBH), which is defined as the diameter of a tree four and one half foot above the ground, and is expressed in square feet per acre. Generally, in stands with trees less than five inches DBH, trees per acre (TPA) is used. In stands dominated by larger trees, BA is used. One of the purposes of this project is to lower densities to those that are consistent with low beetle hazard ratings (Helms 1998).

Size class will be defined by quadratic mean diameter (QMD), which is the diameter of a tree with the average basal area within a stand measured on a per acre basis. In most of the stand types, it is desirable to increase QMD (Helms 1998).

Species composition is the percent of a stand made up of different species. It is defined by the total TPA or BA that one species represents as a percent of the total TPA or BA within a stand.

Genetic component for this project is defined by the percent of a stand that has off-site trees planted in the first half of the last century. Visual characteristics of individual trees is used to determine which trees are off site. Within this project area, this generally includes large ponderosa pine that are pre-maturely dying to normally non-lethal diseases.

Landscape and stand level data, as well as a review information of past, present, and reasonably foreseeable management action information (Table 9), was used to assess the existing condition and how these resource elements are affected by the proposed action. Additional information regarding the methods used to complete this analysis and rationale behind using these resources elements and indicators are included in the project file.

Summary of Effects to Forest Vegetation

A brief summary of effects is described here, while additional details supporting this summary is included under Direct and Indirect Effects and Cumulative Impacts.

The proposed action would trend the landscape towards desired conditions and meet the purpose and need by:

- reducing stand density and increasing age class, size class, and species diversity in the project area,
- removing ill-adapted off-site trees planted in the first half of the last century,
- recovering the economic value of forest products to support and sustain local economies, industries, and livelihoods,
- increasing the amount of rust resistant western white pine,
- decreasing the amount of root rot infections, and
- reducing the amount of mistletoe in the project area.

Indirect effects of the proposed action would reduce the likelihood of future landscape level mountain pine beetle attacks. These activities would also lower Douglas-fir beetle and western spruce budworm hazard ratings, and lower the probability of torching in multi-story stands (also see Fuels Management section). Table 11 below provides a summary of how resource indicators will change with treatment.

Table 11. Summary of effects to forest vegetation resource by indicators by the No Action Alternative and Proposed Action.

Resource Element	Resource Indicator	No Action Alternative	Proposed Action
			Effects to both ponderosa pine/Douglas-fir types and western larch/western white pine types
Structure	Density – BA	Highly variable, upper range is 150-250	Lowers to 40 – 80 square feet depending on size classes. Where insufficient desirable species exist, this could go as low as 5-10 and unit would be planted to desirable species
	Density – TPA	Often multiple size classes, with multiple stories, much of the project is >200 TPA	Decreases
	Size Class – QMD	Little representation of smallest and largest size classes, see figure 2	Increases in stands with intermediate harvest and decreases in stands with regeneration harvests
Species Composition	% of early seral species	High percent of late seral species, such as grand fir, hemlock, and Douglas-fir. Percent of late seral will increase as the stand moves through succession	Increases
Genetic Makeup	% off-site trees present	Highly variable, some stands have >20% off site trees, while some have none	Decreases

Direct and Indirect Effects

The direct and indirect impacts of the proposed action are presented by effects to the resource elements and indicators discussed in Table 10 for specific proposed management activities.

Regeneration Harvest Treatments/Planting

Regeneration harvest would remove most mature trees at varying levels depending on specific stand conditions, creating a mosaic of shelterwood, seed tree, and clear cuts. Trees would be retained as required to meet forest snag and snag retention requirements. In almost all cases, these stands are heavily infected with root rot, mistletoe, and western spruce budworm, are susceptible to Douglas-fir beetle, or have a high percentage of off-site ponderosa pine. Following removal, regenerated stands would be planted to a mix of species depending on site conditions. This would create young, generally two-aged stands with a large component of seedlings and a smaller component of mature older trees. Because of the retained legacy structure and retention of live, healthy early seral tree species, most of the regeneration harvests would create early-successional forest ecosystems (Swanson et al. 2011). These, mixed with other treatment types and non-treated stands would create a landscape with multiple successional stages, which increases large scale resiliency.

Dry ponderosa pine/douglas-fir types would mostly be planted to ponderosa pine with wetter inclusions planted to western larch and in some instances rust-resistant western white pine. This will have the indirect effect of restoring these sites to species that used to be in much higher abundance and are more resistant to environmental stressors, including fire.

Western larch/western white pine types would be planted to western larch and blister rust resistant western white pine. This would reduce mistletoe infections in western larch and increase the percent of western white pine in the project area. Indirect effects would reduce the amount of white pine blister rust and lower mountain pine beetle hazards at the project level.

Resilience would increase as resource indicators fall into a desirable range with implementation of the proposed action. Shifting species composition towards early seral species, creating more spatial heterogeneity in terms of size class distribution across the landscape would lower the overall susceptibility to a host of insect and diseases at the same time. Susceptibility to these impacts may occur at different time in different stands across the project areas, but with no management activity, the majority of the project area would continue to be susceptible.

Indirect effects not already discussed include creating a trend for the entire landscape toward desired conditions in terms of species composition, size class diversity, insect and disease resilience, removal of undesirable off-site genes, and changing large-scale fire behavior.

Effects of Large Openings

This project proposes to create three openings through regeneration harvests that are greater than 40 acres in size. These larger openings would range in size from 123 to about 444 acres, mimicking natural disturbance patterns. Varying densities of trees would be retained within these areas, from scattered individual trees to groups of trees consisting of the largest, healthiest trees. Compared to intermediate harvest areas and untreated forests, regenerated areas would appear as openings until new trees grow to fill the site. Several regeneration harvest treatment areas would create forest openings that exceed 40 acres in size due to existing conditions and current environmental stressors (i.e. insects and disease).

It is appropriate to create large patches that are consistent with the type of disturbance native to this ecosystem (Churchill et al. 2013). Historically, fire created large openings within the project area. An examination of some of the largest fires during the first half of the last century within one mile of the project area reveals the magnitude of these fires, as demonstrated in Table 12.

Table 12. Acres of historic fires within 1 mile of the project area.

Fires Year	Total acres of historic fire that occurred	Acres within Cruzane
------------	--	----------------------

	within 1 mile of the project area	Project Area
1910	457,093	3,000
1921	2,709	6
1924	4,216	0

The proposed openings have species composition that is not resilient to fire or insect and disease (see Need for the Proposal). This is mostly due to root rot in Douglas-fir, mistletoe in Douglas-fir and western larch, or stands of lodgepole pine that have greater than 80 percent mountain pine beetle mortality. Creating these openings and planting them to an early seral species mix of western larch, ponderosa pine, and western white pine and maintaining them at appropriate stocking levels will create stands and a landscape better able to fend off insect and disease and survive fire.

These three openings currently have substantial variability in terms of stocking, species composition and levels of insect and disease impacts. Portions of all three units will have residual stocking levels after harvesting that make them appear less like parts of openings and more like intermediate harvests that have left a stocked stand behind. Where these areas of higher retention result, planting will not take place and the Forest Service will not intentionally seek to initiate natural regeneration because these areas meet stocking requirements. This will help to create species, age class, and structural diversity at both the unit and project scale (Turner et al. 2013). Outside of these retention areas, these openings would be planted with early seral species (western larch, ponderosa pine, and rust resistant western white pine). Restoring western white pine to the project and landscape would create resilience at a broad scale (Hines 2013); (Nuenschwander et al. 1999).

The resulting mosaic of harvest intensities within these large opening would maintain legacy forest structure in these stands which also leads to healthier and more diverse stands (Franklin et al. 2007). The resulting a mosaic of age classes at the project level, which would reduce the amount of acres in the project area that are susceptible to a particular insect or disease at one time.

Intermediate Harvest Treatments

Intermediate harvest consists of pre-commercial thinning, commercial thinning, and improvement harvest.

In all vegetation types, commercial thinning would help shift resources toward desirable leave trees, while removing undesirable seed sources and competition.

In dry ponderosa pine-Douglas-fir types, these types of treatments would heavily favor healthy ponderosa pine where they exist rather than promote Douglas-fir, true firs, hemlock, and lodgepole pine. On sites where healthy larch are present, these trees would be favored. The proposed action would shift stands towards healthy ponderosa pine-dominated stands, which are far less susceptible to *Armillaria* root disease, Douglas-fir beetle, western spruce budworm, dwarf mistletoe. It would also reduce the amount of ladder fuels present. Restoration and improvement of the local gene pool will begin as off-site ponderosa pine planted during the first half of the last century would be removed and the best phenotypical trees of desirable species would be promoted and retained.

Generally speaking, this suite of treatments would change forest structure by shifting size class distribution up by favoring larger healthy ponderosa pine and western larch. There are some instances where larger Douglas-fir would be removed in favor of smaller ponderosa pine or larch, but that would not be typical. This would have the effect of increasing the likelihood that these stands would turn into old

growth because the threat of environmental stressors (availability of resources, impacts of insect and disease, etc.) acting on these stands would be reduced (Arno et al. 1997) (Naficy et al. 2010).

Reducing stand density reduces severity for mountain pine beetle or western bark beetle in ponderosa pine. Lowering stocking in these stands will reduce basal area to 40 to 80 square feet while maintaining multi-aged stands. Stands with smaller trees can have higher basal areas and still retain beetle resistance than stands with larger trees that have advanced in structural stage (Gibson 2004); (Bell Randall 2004); (Oliver and Larson 1996).

Effects of intermediate harvest on western larch/western white pine dominated stands would be to lower stocking levels and shift species composition away from Douglas-fir, lodge pole pine, and grand fir and more towards western larch/western white pine. This would dramatically reduce the amount of *Armillaria* root rot in the project area because western larch and western white pine have low susceptibility to this disease. Note that many of the stands dominated by this vegetation type have mistletoe infected larch, high percentages of Douglas-fir infected with *Armillaria* root rot, and very little rust resistant western white pine. Therefore, there are few acres of the vegetation type that would be treated with intermediate harvest. Please see the effects associated with Regeneration Harvest Treatments/Planting.

In regards to indirect effects of intermediate treatments, reducing this target basal area and removing most of the lower canopy layers would lower both western spruce budworm and Douglas-fir beetle hazards (Kegley 2011, Pederson et al. 2011).

Ecosystem Maintenance Burning

Burns planned for the south facing ponderosa pine stands will support the vegetation to trend towards desired conditions by reducing the amount of smaller shade tolerant species like Douglas-fir in favor of ponderosa pine and lower overall stocking levels to make these water deficit sites have fewer trees competing for scarce water. Some desired trees may be killed in burning operations, but fire killed trees, particularly ponderosa pine are more persistent than snags created by other mortality agents; therefore, make good persistent habitat (Russell et al. 2006).

Cumulative Impacts

Existing vegetation conditions reflect past timber harvest, stand tending, grazing, homesteading, and fire suppression and other activities that influenced forested vegetation in the project area. Table 9 (page 21) displays a list of past, present, and reasonably foreseeable future activities considered in cumulative analysis.

Timber harvest occurred over approximately 30 percent of the project area from the 1950s to present to support mining, homesteading and sawmills. Based on records of past activities, timber harvests occurred from the 1960s to the current time, mostly between the 1960s and 1970s. Roughly 690 acres of regeneration harvest took place in the form of individual tree selection, shelterwood, clearcut, and seed tree cut. Approximately 540 acres of intermediate harvest took place in the form of commercial thin, salvage cut, liberation cut. Pre-commercial thinning occurred over approximately 97 acres within the project area, much of this was in past commercial units.

Past timber harvest had two main effects on forested vegetation within the project area. One effect was to set successional pathways back to early seral conditions by regenerating stands and planting them to early seral species or implementing an intermediate harvest, such as liberation or commercial thin. These treatments left mostly early seral species, which are desirable.

In some cases, especially individual tree selection harvests, led to dysgenic selection of trees – meaning that trees of desirable species and form were taken and less desirable species were left, thus leading a degradation of genetic quality for trees on site and into the future. So the impact of past harvest on species composition is mixed – certain harvests promoted quality, early seral species, but some left less desirable species from early to late seral. It is difficult to discern exactly what happened and where within the project area because there are a myriad of other factors that influenced current species composition.

Ongoing and future actions include the possibility of stand tending in the form of pre-commercial thinning; commercial harvest ranging from commercial thinning to clearcutting with reserves; and continued weed management. Any harvest that takes place and follows NEPA, the Forest Plan and other relevant laws and regulations would necessarily not lead to high grading and should leave stands trending towards desirable conditions of species composition, density, and size class distribution. Any future prescribed burning would have a similar effect by generally killing smaller less desirable trees in favor of larger early seral species.

Fire suppression has had the greatest influence on existing stand structure, species composition, and age class distribution in the project area. There are no records, and it would be impossible, to understand the number of acres that were kept from burning as the result of fire suppression. But looking at these forest characteristics, the impact of fire suppression can be seen. Fire suppression has dramatically increased the amount of late seral species, especially Douglas-fir and grand fir, which existed in much lower numbers prior to active fire suppression. These species have subsequently increased the amount of *Armillaria* root rot within the project area because they are the primary susceptible hosts of this disease. The average size class across the project area is smaller than it would have been in the presence of fire as the largest trees are most likely to survive the impact of fire. Trees per acre is much higher than it historically would have been with fire present to naturally thin stands. A shift to later seral species (Douglas-fir, grand fir) and increased tree density has pre-disposed the project area to higher levels of insect and disease. Continued future fire suppression will likely have deleterious consequences on forested vegetation within the project area, similar to the effects of past fire suppression.

Fuels Management

This section of the effects analysis discloses the anticipated effects to fuels within the project area as a result to the proposed action. Additional information regarding methodology, data sources, and other information supporting the conclusions summarized here can be found in the resource report in the project file.

The Cruzane Mountain south face, north face and along National Forest Road 288 are all in need of fuels treatments (see Need for the Proposal). Every year, trees, brush and grass continue to grow and die, causing an ever-increasing fuel load. For centuries, wildfire has been nature's way of eliminating this fuel. The exclusion of fire (since 1910) allows fuel build-up to continue, unless management activities are used to eliminate fuel, or wildfire burns them. Eventually, fuel accumulations build to such an extent that fire suppression efforts fail, and large wildfires occur. This increasing build-up of fuel will continue unless active management is used to reduce the fuel or wildfire consumes the fuel.

Private land ownership and residential development is located west, north and east of the project area with Interstate 90 running along the southern border. Typical winds for the area are generally out of the west and southwest which align with the local topography as winds tend to funnel down the St. Regis River and down Silver Creek. With the combination of local winds, steep slopes, and the south aspect along the Interstate 90 face, any fire starts along the Cruzane south face could expect rapid fire growth towards the

east and northeast. Any fire starts along the north face could expect fire growth upslope (mainly moving south) and to the east. Under the right circumstances, stand replacement fire could occur.

Three major components of the wildlife fire environment are: Fuels, Weather, and Topography. Because fuels are the only component that can be altered or controlled through land management activities, the effectiveness of fuels management is the focus of this analysis. Factors considered in fuels management include characteristics of fuels, such as:

- Fuel loading
- Size and shape
- Compactness
- Horizontal continuity
- Vertical continuity
- Chemical content
- Fuel moisture

Manipulating these factors can influence fire behavior. The proposed action was developed to help accomplish the goals of this project related to reducing fire hazards within the project area. (Agee and Skinner 2005 C.N., 2005. Basic principles of forest fuel reduction treatments. Forest Ecology and Management 211, 83-96) summarized principles of fire hazard reduction:

Table 13. Principles of fire hazard reduction (McIver and Fettig 2010).

Principle	Effect	Advantage	Concerns
Reduce surface fuels	Reduces potential flame length	Control easier; less torching	Surface disturbance is less with fire than other techniques
Increase height to live crown	Requires longer flame length to begin torching	Less torching	Opens understory; may allow surface wind to increase.
Decrease crown density	Makes tree-to-tree crown fire less probable	Reduces crown fire potential	Surface wind may increase and surface fuels become drier.
Keep big trees of resistant species	Less mortality for the same fire intensity	Generally restores historic structure	Less economical; may keep trees at risk of insect attack

(Graham et al. 2004) adds “reduce continuity of the forest canopy” to the list of objective, quantifiable fuel treatment criteria (principles). (Peterson et al. 2005) supports that potentially effective techniques for reducing crown fire occurrence and severity are to reduce surface fuels, increase canopy base height, reduce canopy bulk density, and reduce forest continuity.

The Photo Guide for Appraising Downed Woody Fuels in Montana Forests (Fischer 1981) developed an adjective rating scale for five different expressions of fire behavior: Rate of Spread, Intensity, Torching, Crowning, and Resistance to Control (Table 14). Using the Principles of Fire Hazard Reduction Treatments and local threshold constants derived from the Lolo West Fire Danger Pocket Card (project file), adjective ratings were applied to fire behavior effects on completed fuels treatments.

Table 14. Adjective Rating Scale for expressions of fire behavior (Fischer 1981).

Rate of Spread
<u>Nil</u> – fire cannot sustain itself.

<p><u>Low</u> – spread will be slow and discontinuous.</p> <p><u>Medium</u> – uniform spread possible, but can be stopped by aggressive ground attack with hand tools.</p> <p><u>High</u> – spread will be rapid; indirect attack on fire front may be required for control.</p> <p><u>Extreme</u> – spread will be explosive; little chance of control until weather changes.</p>
Intensity
<p><u>Nil</u> – fire cannot sustain itself.</p> <p><u>Low</u> – cool fire; very little hot spotting required for control.</p> <p><u>Medium</u> – fire will burn hot in places; aggressive hot spotting with hand tools likely to be successful.</p> <p><u>High</u> – too hot for sustained direct attack with hand tools; aerial tankers or large ground tanker [mechanized equipment] required to cool fire front.</p> <p><u>Extreme</u> – direct attack not possible; air or ground tanker [mechanized equipment] attack likely to be ineffective.</p>
Torching
<p><u>Nil</u> – no chance of torching.</p> <p><u>Low</u> – occasional tree may torch-out.</p> <p><u>Medium</u> – pole-sized understory trees likely to torch-out.</p> <p><u>High</u> – Most of understory and occasional overstory trees likely to torch-out.</p> <p><u>Extreme</u> – entire stand likely to torch-out.</p>
Crowning
<p><u>Nil</u> – sustained spread in crowns will not occur.</p> <p><u>Low</u> – sustained spread in crowns unlikely.</p> <p><u>Medium</u> – some crowning likely but will not be continuous.</p> <p><u>High</u> – sustained crowning likely.</p> <p><u>Extreme</u> – sustained crowning will occur.</p>
Resistance to Control
<p><u>Nil</u> – no physical impediments to line building and holding.</p> <p><u>Low</u> – occasional tough spots but not enough to cause serious line building and holding problems.</p> <p><u>Medium</u> – hand line construction will be difficult and slow, but dozers [mechanized equipment] can operate without serious problems.</p> <p><u>High</u> – slow work for dozers [mechanized equipment], very difficult for hand crews; hand line holding will be difficult.</p> <p><u>Extreme</u> – neither dozers [mechanized equipment] nor hand crews can effectively build and hold line.</p>

The Cruzane Mountain project was broken into three distinct areas to help focus fuels analysis.

- South Slopes: Area 1 encompasses the proposed Low Severity (LS) prescribed burns LS1-LS3 as well as the commercial harvest Units 4-20, 27, 28, 30, 31, 57, 42 and 70.
- North Slope: Area 2 encompasses the commercial harvest Units 1, 3, 21-25, 27, 29, 31, 43-54B, 56 and 68.
- Valley Bottoms: Area 3 encompasses the proposed Fuel Break (FB) Units FB1 and FB2, the pre-commercial thin (PCT) Units 58A, 58B, 59 and 69, and the commercial harvest Units 60, 61, 62A-62D, 63, 64, 66 and 67.

Direct and Indirect Effects

Proposed fuel treatments within the project are considered active management using fire to reduce forest fuel levels, improve and maintain big game winter range, and as a disturbance process to modify vegetation to improve its resiliency to undesirable fire effects which can result in conditions where a wildfire may have less detrimental consequences.

All commercial vegetation treatment units proposed action would receive a post-harvest fuels treatment. Site-specific variations may occur, but the majority of the harvest units would receive a prescribed underburn. Those harvest units which do not receive an understory prescribed burn would have ground fuels and slash piled and burned. Once burning or pile and burning is complete the resulting timber stand

would have lower fuel loads, ladder fuels would be decreased or eliminated, live crown heights will be raised, crown density will be decreased and canopy continuity will be decreased. Overall firefighter safety and efficiencies would be increased, chances for crown fire development would be decreased and potential wildfire intensity and severity will be decreased.

The proposed action would provide the following conditions for the next 10-35+ years:

- The south slopes would reintroduce fire as a disturbance process and would be in line with the natural fire regimes. The existing surface fuel accumulations and existing ladder fuels would be reduced. Scorching the lower limbs of mid-story and overstory trees would raise crown base heights. Shrubs would be rejuvenated and improve winter range browse values.
- The north slopes would have fire reintroduced as a disturbance process. The existing surface fuel accumulations would be reduced, ladder fuels would be reduced and crown base heights would be raised. The harvest would break up the canopy continuity and create a mosaic of size and age classes.
- The valley bottom treatments which receive a prescribed burn would reintroduce fire as a disturbance process and would be in line with the natural fire regimes. The existing surface fuel accumulations and existing ladder fuels would be reduced. Scorching the lower limbs of mid-story and overstory trees would raise crown base heights. Shrubs would be rejuvenated and improve winter range browse values. The valley bottom treatments which do not receive a prescribed burn will have pile treatments designed to replace fire as a disturbance. Piling and burning cannot actually replicate all of the effects of fire therefore these areas would not specifically be moved towards natural fire regimes. However treatments would increase opportunities to gain tactical advantages for effective suppression and existing surface fuel accumulations and existing ladder fuels would be reduced.

Efficiencies of firefighters would be increased. Initial attack of a wildland fire (line construction, holding, and mop-up) would become less difficult with the light fuel loadings, less potential for aerial fuels to become involved with fire, and fewer danger trees present. Suppression actions on large fires would find tactical advantages because of the treatments and placement of treatment units. With the proposed treatments, suppression efforts would experience the following benefits for the next 10-35+ years:

- Line construction would proceed at a faster rate because less work would be required to construct an appropriate fuel break and fireline through light surface fuels and minimal tree regeneration. Aerial delivery of water or retardant would be more effective in cooling the fire because of the lighter fuel loadings. Areas would have fewer danger trees that need to be felled for firefighter safety.
- Holding would be less complicated and more successful due to the reduced potential for spotting from torching trees and limited fuel concentrations. Water would be more effective in supporting holding efforts because of the light fuels. Burnout operations would be lower risk due to reduced potential for spotting from torching trees and short residency time of fire in light fuels.
- Mop-up to secure the fire from escape would take less time due to short residency time of fire in the light fuels.

Chances for crown fire development would be lessened because the risk of torching is reduced by treating heavy surface fuels and ladder fuels. The horizontal continuity of tree crowns would be reduced, so there would be less potential for crown fire runs that compromise the fireline and put firefighters at risk.

Fire intensity and severity would be reduced. Overstory mortality would be low because fire intensity should not be high enough to kill overstory trees. Flame lengths should be at the level firefighters can use

direct attack by hand crews. There would be less snags and hazard trees that need to be felled for firefighter safety which allows crews to move quicker.

Firefighter ingress and egress would be improved. Ingress/egress on existing road systems is a major consideration when initial attacking fires. Forest roads are a key factor influencing management of wildfires because they serve as fire breaks and provide access for fire suppression activities. With the proposed new road building and improvements to the existing road systems, firefighter access is greatly increased. In addition, roads are commonly used for burnout and holding operations, consequently any work done near roads in advance of a wildfire improves the odds of successful operations.

The proposed action would not prevent a wildfire. It is not a guarantee that homes and property would not burn. Proposed treatments would not reduce the ignitability of structures. Case studies indicate that a home's structural characteristics and its immediate surroundings determine a home's ignition potential in a wildland-urban interface fire (Cohen 2000). Proposed treatments would not eliminate the threat to the community from a wildfire. What the proposed action would do is substantially reduce the chances of catastrophic wildfires within the project area lessening the threat to the surrounding communities and provide better opportunities for tactical advantages during suppression actions.

Table 15. Adjective ratings were applied to fire behavior effects on completed fuels treatments within all three of the Cruzane Mountain project areas.

	South Slopes Post-treatment, approximately 10+ years				
	Rate of Spread	Intensity	Torching	Crowning	Resistance to control
Reduce surface fuels	Medium	Medium	Low	Low	Low
Increase height to live crown (ladder fuels)	Medium	Low	Low	Low	Low
Decrease crown density	Medium	Medium	Low	Low	Low
Keep big trees of resilient species	Medium	Low	Low	Low	Low
Reduce continuity of the forest canopy	Low	Low	Low	Low	Low
Total: 6 Medium Ratings, 18 Low Ratings					

	North Slope Post-treatment, approximately 10+ years				
	Rate of Spread	Intensity	Torching	Crowning	Resistance to control
Reduce surface fuels	Medium	Medium	Low	Low	Medium
Increase height to live crown (ladder fuels)	Low	Medium	Low	Low	Medium
Decrease crown density	Medium	Medium	Low	Low	Medium
Keep big trees of resilient species	Low	Medium	Low	Low	Medium
Reduce continuity of the forest canopy	Low	Medium	Low	Low	Medium
Total: 12 Medium Ratings, 13 Low Ratings					

	Valley Bottoms Post-treatment, approximately 10+ years				
	Rate of Spread	Intensity	Torching	Crowning	Resistance to control
Reduce surface fuels	Low	Medium	Medium	Low	Medium
Increase height to live crown (ladder fuels)	Low	Medium	Medium	Low	Medium
Decrease crown density	Medium	Medium	Medium	Low	Medium
Keep big trees of resilient species	Low	Medium	Medium	Low	Medium
Reduce continuity of the forest canopy	Low	Medium	Medium	Low	Medium

Total: 11 Medium Ratings, 14 Low Ratings
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Cumulative Impacts

There are many past, present, and reasonably foreseeable actions that have influenced, are influencing or will influence vegetation in the project area (Table 9). Wildfires (2 acres) and prescribed burning (552 acres) since 1980 account for some more recent fuels treatment to consider in cumulative effects analysis. Outside of these influences, the long-term trend of vegetation development in the area shows increasing amounts of fuel as biomass continues to accumulate at many times the removal rate. Insects and disease have killed and continue to kill a large proportion of lodgepole pine and Douglas-fir within the project area, primarily at mid-and upper elevations. The resulting red-needled trees have high crown fire potential because the fine fuel is already dried out. After the needles fall, the crown fire potential is reduced. Within a few years, the trees start falling and generate heavy surface fuel loads. The understory develops due to increased light and moisture, increasing ladder fuels. Any large wildfires in the future would reduce biomass on the acres burned, but any area not burned would continue adding to the 100-plus years of growth and biomass accumulation. Disturbances from active management as proposed using prescribed fire and/or mechanical treatments would reduce the amount of biomass within the treatment areas.

Successful wildfire suppression has resulted in development of stand structures and densities that are not representative of natural historic levels and are setting stands up for high severity stand-replacing wildfire on moist sites and at higher than historical levels on drier sites that typically would have had repeated low severity wildfires. Any large wildfires in the future would alter stand structures and densities on the acres burned and severity may be uncharacteristic for the particular fire regime. Disturbances from active management using prescribed fire and/or mechanical treatments would alter stand structures and densities on the acres treated and severity should be typical for the particular fire regime.

In 1999 one prescribed burn totaling 552 acres was completed within the project area on the south face above the I-90 corridor. Since 20 years have passed since the burn was completed, surface fuels have slowly started to accumulate and ladder fuels have developed. The area burned is classified as a fire regime group 1, meaning the natural fire occurrence can range from 0-35 years typically with a low severity fire. This area is once again ready for another entry of prescribed burning. Once complete, surface fuels will be reduced, ladder fuels will be reduced, and crown base heights will be increased so stands are more resilient to wildfire.

In the 1960's, 70's and 80's 1331 acres of the project area was harvested or pre-commercial thinned. These areas have seen over 30 years of growth in the vegetation. This develops stands that are extremely dense. Surface fuels generally have higher fuel moistures because of the lack of sunlight. Expected fire behavior would be an "all or nothing" situation, meaning that on an average year little to no fire behavior would be expected, however on bad fire years when fuels are on the extremely dry side conditions could produce extreme fire behavior. Once these stands develop into mature trees stocking levels will be high and pose a high risk for crown fire development.

Road construction has the direct effect of removing vegetation and therefore creating discontinuity of fuels. Indirectly, roads provide access for a variety of past and potential vegetation management projects that may or may not reduce fuel hazard. Roads can provide access that can both increase the risk of human-caused wildfire and increase the effectiveness of wildfire suppression.

Firewood cutting along open roads removes large woody fuel from the forest, resulting in decreased fire hazard in some areas with extensive mortality that has been cut. When tops are left scattered on the ground, the fire hazard is increased in the surface fuel layers.

Private land development in many cases has resulted in long-term reduction of fuels as land is cleared and maintained as lawns or irrigated fields. Private land timber harvest had a great effect on reducing crown fire potential by reducing canopy continuity and bulk density, but often surface fuels were increased by choice of slash disposal method.

Air Quality

This section discloses the effects to air quality as a result of implementing the proposed action. Additional information about methodology, data sources, and other information supporting the conclusions summarized here can be found in the resource report in the project file.

Air quality in the project area is generally excellent, and the area is in attainment for all National Ambient Air Quality Standards (NAAQS). The primary source of project-related air emissions will be from prescribed fire smoke, and the main NAAQS of concern will be particulate matter (PM).

Potential project air quality impacts were calculated for PM_{2.5} and PM₁₀ using the First Order Fire Effects Model 6.5. Model results show that emissions from prescribed fire activities, including concerns about the odors, visibility and public health associated with fire, would be noticeable, but short-term, and would not exceed NAAQS limits.

Because the project would substantially reduce fuel continuity and arrangement as described in the Fuels Management presenting in the Environmental Assessment, modeling shows that if a wildfire occurred in the project area post-treatment, PM_{2.5} and PM₁₀ emissions would be reduced approximately 73- to 75-percent over the no treatment scenario.

The Forest Service annually obtains a burning permit from the State of Montana. All burns are coordinated through the MT/ID Airshed Group and the Montana Department of Environmental Quality to meet air quality standards and comply with Best Available Control Technology requirements. These requirements help limit harmful effects from prescribed fire emissions and help prevent project activities from adversely affecting or exceeding any state or Federal air quality requirements.

Scenery Resources

This section discloses the proposed actions effect to scenic resources based on the Forest Plan and the Scenery Management System handbook. Additional information is included in the project file.

The Scenery Management System handbook notes that landscapes that include both diversity and harmony have the greatest potential for highly valued scenery. Furthermore while all landscapes are viewed by someone at some time from somewhere not all landscapes are valued for their aesthetics in the same way. The existing scenic character of Cruzane Mountain and the desired scenic character for Cruzane Mountain discuss the differences in the aesthetic today as well as valued attributes that can better exhibit diversity and harmony on the Cruzane Mountain landscape.

Table 16. Scenery resource element, indicator and measure to assess effects.

Element	Indicator	Measure
Scenic character	Management activity deviations from visual quality objectives	acres that meet or exceed visual quality objectives

Source: Visual Management System and Scenery Management System Handbooks.

Existing Scenic Character and Integrity

The existing scenic integrity of Cruzane Mountain is that it is meeting or exceeding the visual quality objectives as described in the Forest Plan. There is little to no evidence of management action deviations and the area appears natural or unaltered. However there is also little replication of the true ecological condition within the historic range of variability. There is little evidence of the diversity in age classes, vegetation types, open and closed canopy texture, and color variety to appear natural within the ecological range that is appropriate for the area. The homogenous canopy does create a pleasing and complete appearing landscape with regards to form, line, color, texture, and pattern but the color, texture and pattern in particular are not within the historic range of variability for the ecosystem. This flat, monotone composition does not reflect the diversity and variety that might have been created in the past when there was less influence of management decisions to reduce the influence of fire and to stock stands with inappropriate vegetation species. There is little to no mixture of form, line, color, texture, and pattern. Cruzane Mountain appears as a dark forest green, soft flat-topped dome with a consistent flat and uniform appearance.

Direct and Indirect Effects

Forest Vegetation Harvest

The proposed action should not cause substantial direct or indirect effects to the scenery resource because of project design (Appendix B) to reduce the scenic contrast between the management activities and the scenic character of the area. Table 17 discusses the concern for specific units within the project area based on their visibility and visual quality objectives. All of the units identified in this table require design features to meet or exceed their visual quality objectives in the long-term. Most of the units within the table are those within the retention visual quality objective. In these units implementation of the management activities proposed would change the appearance from the existing condition. Since the existing condition is one of natural appearance, change may be presumed to appear unnatural, but the design features are proposed to reduce or eliminate the unnatural appearance albeit still a changed appearance. In the short-term some of these activity driven changes may diminish attainment of the retention visual quality objective until planted saplings and natural regeneration growth occurs to better diversify the appearance and fully replicate the ecologically appropriate form, line, color, texture and pattern of the landscape. The scale of the units as well as the scale of the openings within these units is larger than the existing condition scale of openings but these openings are within scale of one another and within the scale of openings within the historic range of variability for the ecosystem. In the long-term these units should meet or exceed this visual quality objective and become more scenically stable by reducing the risk of a large-scale alteration to the scenic landscape which could diminish the scenic character and appear unnatural. Likewise, some of the rest of these units would not meet their partial retention visual quality objective in the short-term but in the long-term the vegetation diversity in structure, form and texture should increase the scenic variety and create a more stable scenic composition. These units are expected to meet or exceed the partial retention visual quality objective and better retain the scenic character of the area in the long-term.

The proposed action may benefit the scenic character by increasing the scenic stability of the area by moving project area acres toward meeting or exceeding their visual quality objectives in the long-term. Reducing overstocked stands, reducing insect and disease infestations, and reducing the fire risk within the area should indirectly benefit the scenic stability of the project area including those acres not treated by reducing the risk of a large scale alteration to the scenic landscape. The form of the area overall is likely to be retained as are the individual stands where the shape and scale of their forms would be natural and influenced by burning and leave tree clumping. The collective color of the area would likely be

altered to have less cumulative dark forest green, but the altered colors would be natural in appearance and repeat the existing exposed soil colors and the lighter understory vegetation color as well as some additional seasonal color from larch stands. This variety should appear harmonious and natural in the long-term. Design features to replicate the shape and scale of openings to those of either the existing condition or the historic range of variability should help reduce the contrast and allow visual disturbances to remain subordinate and create an aesthetically diverse composition across Cruzane Mountain. Treating the entire mountain with a variety of treatment types should create a more harmonious appearance than treating in a discordant manner in which some areas are and some areas are not treated. This is especially true on the south facing side of the mountain where almost all of the south face would experience management activity. Those areas that do not experience treatment would serve as further mosaic again due to the retention of the dark forest green color, closed canopy form and texture of these areas. When seen in total the area should appear diverse yet connected and complete.

Table 17. Units, their prescriptions, logging systems and visual quality objectives and applicable design features to ensure the unit management activities would meet or exceed their visual quality objective.

Unit ¹	VQO ²	Prescription	Logging System	Concern
4 ³	Retention	Regeneration	skyline	Not visible from concern level 1 travelway or location. Reduce edges especially between non-treatment areas to the south, east and north. Part of greater than 40 acre opening; units 5 and 6 are likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
5	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
6	Retention	Commercial Thinning	skyline and tractor	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
7 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Burning may help reduce discernibility of edges and transition into other treatment areas. Part of greater than 40 acre opening; units 5, 6, and 8 are likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
9 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Natural regeneration by leave trees should diversify the texture and pattern of the unit. Burning may help reduce discernibility of edges and transition into other treatment areas. Part of greater than 40 acre opening; unit 8 is likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
10 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Burning may help reduce discernibility of edges and transition into other treatment areas. Part of greater than 40 acre opening; unit 8 is likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
11 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Burning may help reduce discernibility of edges

				and transition into other treatment areas. Part of greater than 40 acre opening; unit 8 is likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
12	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
13	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
14 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Part of greater than 40 acre opening, with no adjacent intermediate treatments to serve as feathering. Reduce edges especially between non-treatment areas to the south and downslope. Burning between this unit and units 12, 13, and 15 to reduce the likelihood of unnatural appearance in untreated areas between these units.
15	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Reduce edges especially between non-treatment areas on all sides. Burning between this unit and units 12, 13, and 14 to reduce the likelihood of unnatural appearance in untreated areas between these units.
16	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
17	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Reduce edges especially between non-treatment areas on all sides. Burning between this unit and units 14, 15, and 70 to reduce the likelihood of unnatural appearance in untreated areas between these units.
18	Retention	Regeneration	skyline	Only southeastern corner is visible. On this side burn between this unit and units 20 and 70 to reduce discernibility of an unnatural line between the treatment area and the no treatment area.
19	Retention	Regeneration	tractor	Only northwestern corner is visible. On this side burn between this unit and units 20 to reduce discernibility of an unnatural line between the treatment area and the no treatment area.
20	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
41	Partial Retention	Regeneration	skyline	Visible from private properties and travelway accessing these properties. Reduce edges especially between non-treatment areas to the south and east. Create leave tree clumping when possible. Natural regeneration by leave trees should diversify the texture and pattern of the unit.
49	Partial Retention	Commercial Thinning	skyline	Visible from private properties and travelway accessing these properties. Reduce the discernibility of corridors as viewed from the private properties. Align them so they are not directly perpendicular to up-down slope of the hill as viewed from private property.
56	Partial Retention	Intermediate	skyline	Visible from private properties and travelway accessing these properties. Reduce edges especially between non-treatment areas to the south and east. Create leave tree clumping when possible.
66	Partial Retention	Regeneration	tractor	Visible from private properties and travelway accessing these properties. Reduce edges especially between non-treatment areas to the south and east. Create leave tree clumping when possible.

				Planting in irregular pattern to create a mosaic texture.
70	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Reduce edges especially between non-treatment areas on all sides. Burning between this unit and units 16, 17, and 18 to reduce the likelihood of unnatural appearance in untreated areas between these units.
27, 28, 30, 31, 32, 42, 57				In Retention but not visible from a concern level 1 travelway or location. If these units expand or are altered further review to ensure they would meet the retention VQO may be necessary.
Burning unit on westside of project area				Use topography to hold lines on all edges to reduce introduction of unnatural lines into the area visible from private lands.

¹All other units do not have high concerns for meeting or exceeding their visual quality objectives.

²Some units have more than one Visual Quality Objective (VQO) within them. In those cases the more restrictive VQO is listed.

³These units are part of Large Opening (greater than 40 acres number 3)

Source: Scenery analysis, visibility modeling and assessment of effects.

Table 18 highlights the units where short-term effects from management actions are likely to occur that would change the scenery resource from its existing condition. This change would appear in contrast to the existing condition but should appear harmonious and mosaicked in total. With the design features applied these units should appear natural and the management activities remain subordinate in the long-term.

Table 18. Units of Concern for scenery resource impacts in the short and long-term.

Units with Short-term Effects to Scenery	Units with Possible Long-term Effects to Scenery ¹
7, 10-15, 17, 20, 70, 41, 46	7, 10-15, 17, 20, 41

If the design features are implemented the form, line, color, texture, and pattern of the project area should meet or exceed the Partial Retention and Retention visual quality objectives in the long-term. In the short-term the likely discernible effects would be stumps, blackened trees, exposed soil, discernible roadways, and possible linear corridors from skyline harvesting intermediate harvest units. Design features to reduce the impacts of these management activity remnants, should improve the aesthetic quality and reduce the discernibility. In the long-term vegetation growth would diminish the discernibility of these remnants and the increased diversity in species composition, structure and classes should increase the diversity of the scenery in a harmonious way that is aligned with the historic range of variability for this ecosystem. The addition of different vegetation species, especially larch, could increase the seasonal color variety in the area as well as the general color composition all year round. The vegetation diversity should also increase form, texture and pattern variety as well. Structural shifts to more age classes and more diversity in canopy density should also increase the variety of the landscape and maintain a more stable scenic character.

Greater than 40 acre openings

These large openings would create a change to the existing visual composition of the area especially opening 1 and 3 which are visible from Interstate 90 and Milwaukee Grade Trail. This size opening is aligned with the historic range of variability for this ecosystem from the effects of fire. While these areas

¹ These effects are likely if the design features (Appendix B) are not applied. With the design features applied these units should meet or exceed their visual quality objectives.

Source: Scenery analysis.

may create a contiguous 40 acre opening, there would be variation in canopy cover within them, especially in the long-term once planting has begun to restock the areas with a more diverse species composition and age class composition. The plantings would include three species, increasing the diversity of tree composition as well as potentially fall color where the larch plantings occur, creating appealing seasonal visual interest. There are also likely to be leave trees especially in the intermediate harvest portions of these large openings which would break-up the appearance of non-canopy cover as well as provide vertical variation in the landscape's appearance. Introducing this size openings in the canopy would create a more sustainable scenic composition as well as create scenic diversity in a harmonious way by creating multiple of these larger openings. Furthermore these openings would better integrate this project area scenically into the landscape to the east, where other open, canopy-free areas are more frequently occurring.

Roads

The new 4 miles of road are not in visible areas from the concern level 1 travelways and locations. The reconstruction of the existing road through unit 16 to unit 4 is visible and would likely become more visible post-harvest of the units it travels through. In particular the section between units 7 and 9, 10 and 11 would be visible since these units are regeneration harvest units which would expose all terrain around the road. To the extent feasible leaving trees on the downhill side of road within these units is desired to meet or exceed the retention visual quality objective in the long-term. This road reconstruction is not likely to meet the retention visual quality objective in the short-term in association cumulatively with the surrounding units' treatments.

Cumulative Impacts

Timber harvest occurred over approximately 30 percent of the project area from the 1950s to present. The impacts of these past harvests on the scenery resource are generally indiscernible at this point in time. Overall the pattern, texture and color of the project area are dominated by naturally appearing features. There is a bit of discernible evidence of this previous management action when viewed from the south side of the St. Regis River and Interstate 90 but it is not dominate. The most discernible feature is some linear corridors where the canopy is more open than in other areas. However a viewer observing the project area from a viewing platform east of the project area and looking west would perceive the distinctly linear hard edge formed at the boundary of the forest service land and private lands on the south side of the St. Regis River and Interstate 90. This location is outside of the project boundary but overlaps in time and space for the cumulative effects of the project actions for the scenery resource. While the management actions within this project would not diminish this discernible boundary actions in this project area could diversify the canopy within the viewshed of the project area. This may lessen the appearance of this discernible boundary by reducing the dark v. light contrast cumulatively. This is not to say that introducing new hard edge linear features is desirable. Management action design features to emulate natural forms, lines, patterns and textures is desirable within the project boundary to better integrate the management actions to the overall scenic character of the area.

As discussed in the No Action Alternative (page 84) effects historic fire suppression in the area has create an at risk scenic composition. The scenery of the area is deemed to be aesthetic but at risk to a landscape altering event due to the vegetation structure and composition not being within the historic range of variability. The proposed action may reduce the susceptibility of the entire Cruzane Mountain landscape to as extreme an alteration under such an event. The scenic stability of the scenic character is likely to increase due to the proposed management activities. The aesthetics of the area are likely to change due to the activities especially in the short-term but the aesthetics are likely to be more stable long-term, such that they can be maintained in a diverse and harmonious composition into the future. In the long-term all acres in the project area should meet their visual quality objectives.

Table 19. Resource indicators and measures for proposed action.

Element	Indicator	Measure	Effects
Scenic character	Management activity deviations from visual quality objectives	Acres that meet or exceed visual quality objectives	In the short-term approximately 237 acres may not meet or exceed. This is about 6% of the project area. 3,553 acres should meet or exceed in the short and long-term. In the long-term all acres should meet or exceed with design features applied

Source: Fieldwork and analysis.

Terrestrial Wildlife

The section discloses the anticipated impacts to wildlife species by implementing the proposed action. Direct effects were considered by estimating the likelihood and severity of one or more individuals being killed, harmed, disturbed, or injured during any of the project activities. Indirect effects were considered based on changes to habitat and changes in conditions of other variables that could affect the species. Cumulative effects were considered based on either the project area or a broader area if applicable adding effects of other non-project activities with the project effects to ensure their aggregated effects would not result in a loss of viability for any species. A summary is included in this environmental assessment. Additional information about methodology, data sources, and other information supporting the conclusions summarized here can be found in the resource report in the project file.

Proposed and Federally-listed terrestrial wildlife

In accordance with the Endangered Species Act (ESA), its implementation regulations, and Forest Service Manual 2671.4, the Lolo National Forest is required to request written concurrence from the United States Fish and Wildlife Service with respect to the determination of potential effects on grizzly bear and Canada lynx. Wolverine, which is also a regionally sensitive wildlife species, is included in this section as well because it is a proposed species. Pre-consultation discussions have occurred throughout project planning and coordination with US Fish and Wildlife is expected to be complete prior to issuing a draft decision for this project.

Table 20. Summary of likelihood of occurrence for federally-listed and proposed terrestrial wildlife species.

Common Name	Scientific Name	Status	Known/suspected to be present?	Suitable habitat present?	Rationale if not carried forward for analysis in the Biological Assessment
Grizzly Bear	<i>Ursus arctos horribilis</i>	Threatened	Yes	Yes, limited	n/a
Canada lynx	<i>Lynx Canadensis</i>	Threatened	Yes	Yes, limited	n/a
Wolverine	<i>Gulo gulo luscus</i>	Proposed	No	No	Project would not reduce the ability of spring snow to persist on the landscape. Vegetation management was specifically excluded by the USFWS as a risk factor for the species. The project

Common Name	Scientific Name	Status	Known/suspected to be present?	Suitable habitat present?	Rationale if not carried forward for analysis in the Biological Assessment
					would not jeopardize the continued existence of wolverine.
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Threatened	No	No	No large areas of cottonwood or hardwood vegetation. No known occurrences within Mineral County. No effect.
<u>Critical Habitat</u>					
Critical Habitat for Canada Lynx	<i>DPS Unit 3</i>	n/a	No	n/a	No Critical Habitat

Grizzly Bears - Threatened

The Cabinet-Yaak Ecosystem, Northern Continental Divide Ecosystem, and Bitterroot Recovery Zones overlap with the Lolo National Forest. The project area is outside of these areas and about 20 miles south of the southernmost section of the Cabinet-Yaak Recovery Zone. The project area is not within any of the recovery zones or designated areas for bear management, although grizzly bears may be present. A food storage order is in place that applies to all Lolo NFS lands and no access management standards apply to the project area.

Habitat for grizzly bears in the project area is mainly considered low to moderate because the area is unconnected with a large undisturbed area such as a wilderness area and has no existing grizzly population. However, many of the habitats within the area are similar to those that exist and support grizzly bears within Recovery Zones. Thus the opportunity to use the area for either short term movements or for low population densities between higher-population density Recovery Zones is possible. Maintenance of the area's quality in this regard is likely related to the ability to maintain the characteristics suggested by (Servheen et al. 2001, 2003) as critical to linkage zones (road density, human developed sites, presence or lack of vegetative cover, and presence of riparian zones).

No observations nor sign of grizzly bears were observed during field reviews of the area. In summer 2019, a transient, radio-collared male bear from the Cabinet-Yaak Ecosystem crossed near the project area and moved to the Bitterroot Recovery Zone near Stevensville, MT. No other recorded observations exist in the Montana Natural Heritage database (project file) in the project area. No surveys have been undertaken in the project area for grizzly bears. However, because a sighting would be unusual, an observation of a grizzly bear would likely be reported by USFS employees or the public in the area. No reports are known.

To measure potential effects, this analysis assessed the potential of habitat effects on the project area based on the 4 criteria (road density, developed sites, vegetative cover, and riparian zones), as well as a qualitative assessment of the likelihood of disturbance or mortality of bears using the project area occurs.

Direct/Indirect Effects**Effects on Linkage/Connectivity**

Open Road density would not change during or after the project, because all currently closed roads and proposed new roads would be closed after the project is completed, and not open to public use during the project. An additional 4 miles of new permanent National Forest System Road would be constructed on the north side of Cruzane Mountain, but would be closed to the public. This would increase total road density in the project area. Possible disturbance preventing bears from using the area immediately adjacent to these new roads could occur during timber harvest operations, but would not continue through time. Contractor use of closed roads would occur on 1-2 road systems at a time, and be closed to public use preventing further impacts to bears. To maintain elk security, the project would be divided into 3 subdivisions in order to maintain at least part of the project area in a less-disturbed condition.

Human developed sites do not exist in the area and would not increase as a result of the proposed action. However, private homes exist, especially along the west side of the area and Interstate 90 borders the south of the area.

Vegetative cover would change because 522 acres would change from mature, closed-canopy forest to open, partially-harvested forest. An additional 981 acres would change from mature, closed-canopy forest to open, regenerated, stands with fewer trees (no clearcutting is planned). These changes would create more open habitat in this already-roaded, high-human use project area which could make a grizzly bear more visible to humans (and more vulnerable to illegal killing), but would also provide more foraging opportunities. These more open areas would regrow in 15-20 years resulting in dense, young stands with abundant cover. Additionally, 1,161 acres of prescribed burning would increase the quality of spring foraging habitat if bears used the area during spring within a few years post-burn. Even with these proposed treatments, the value of the project to serve as an area through which dispersing or moving bears could travel or use would remain intact.

Riparian areas that could be used by grizzly bears moving through the area would undergo no substantial changes with the proposed project because of the LNF Plan INFISH standards providing buffer distances along streams (up to 300 feet on each side of the stream).

Potential for Disturbance and Mortality

Disturbance and displacement of grizzly bears is possible in the Cruzane Project because the project may have grizzly bears moving through the area or inhabiting it for periods of time. The project duration, including all timber harvest, road work, and prescribed burning is likely 2021-2035 thus bears could definitely move through the area within that time frame. There is likely to be only one area being harvested at a time causing a grizzly bear in the area to simply move away (possibly ¼ to ½ mile) and continue its activity. This disturbance is likely to move around the project area rather slowly, changing locations every 2-4 weeks (sometimes only ¼ mile up the road at a time), so an affected bear would not likely move many times, limiting the impact on the bear. These disturbance related impacts will thus be short-term and have minimal effects on bears because these individuals are likely to be transient male bears which are able to easily move through the landscape.

Cumulative Effects

Public use of the project area would continue. The presence of Interstate 90 along the south edge of the project area is likely a far greater risk to bears than any project activities. There are no other non-federal activities occurring in the project area.

Conclusions and determination of effects

The project May Effect grizzly bears because:

- Density of total roads (closed to the public) would increase
- Forested habitat will be converted into open, regenerating stands where visibility is much higher and bears could be illegally killed
- Project activities will be ongoing for 15 years

The project would not adversely affect grizzly bears because:

- Grizzly bears have not been observed in the area, and thus are not expected to occupy the area on a regular basis
- No areas of known grizzly bear regular use are within many miles.
- Anticipated effects would mainly cause bears to move to a nearby area to continue their activity. This level of disturbance is very minimal and discountable.

Based on these conclusions, the proposed action *may effect but is not likely to adversely affect grizzly bears*.

Canada Lynx and Critical Habitat - Threatened

The project area is within the Northern Rockies lynx population area which is occupied with a persistent population, but the project area (and entire county) is poor lynx habitat because of the lack of expanses of boreal, spruce-fir forests. The forest types used most heavily by lynx are present in the project, but only in very small inclusions likely prohibiting the ability of lynx to persist in this particular area. Following the definition of lynx habitat (Interagency Lynx Biology Team 2013 and USDI National Park Service. Forest Service Publication R1-13-19, Missoula, MT. 128 pp.);(USDA 2007a), most habitats within the project area classify as “secondary habitats” for lynx. Surveys in the Wilkes LAU (and nearby West Fork Fishtrap LAU) support a conclusion that these LAUs have very low snowshoe hare densities and thus are not likely to support lynx in the long term regardless of forest age or harvest history (LNF Unpublished data). These surveys showed abundant horizontal cover (48-65%), but low snowshoe hare numbers (0.35-0.45 hare/ha) (measured by pellet plots) (LNF, Unpublished Data) even though these areas were dominated by mature forests. This indicates that habitats on the Superior and Plains/Thompson Falls Ranger Districts may be poorly suited to support a lynx population. The project area is within two Lynx Analysis Units: Wilkes and Savenac.

The US Fish and Wildlife Service designated a portion of the Lolo National Forest as Lynx Critical Habitat in 2013. The closest designated Critical Habitat is about 48 miles of the project area (U.S. Department of Interior 2013).

Several surveys for carnivore tracks occurred in 2011 north of the project area in prospect Creek north of the project area and in Ward Creek south of the project area. No lynx were observed. Also, no lynx observations from the project area are known from the MT Natural Heritage Database (project file).

Direct/indirect Effects

Changes in Human Uses or Disturbance

Disturbance and displacement of lynx may occur in any area where lynx could be present. Because the area contains almost no lynx habitat and has had no known lynx detections, disturbance is unlikely to cause any adverse effects. However, because lynx use very large areas and can move great distances, disturbance could always occur in a rare instance during project activities. Because the project would likely continue for a few years (e.g. 2021-2035), disturbing or displacing a lynx may occur during this period because of harvest activities, log haul, or road reconstruction/decommissioning. This disturbance would likely affect no more than one lynx at a time and across the term of the project. This is because

lynx are generally not known to occupy the project area. If a lynx were in the area, it could move away from activity areas in a span of minutes and resume normal activities. Disturbance would be a substantial effect.

Amount of Lynx Habitat Modified

No Mature Multistoried winter foraging habitat would be affected. The stands that would be harvested are currently mature single and two story stands. In some cases multistory stands lacking in horizontal cover (thus unsuitable for high snowshoe hare numbers) would be treated. These stands do not provide high quality foraging areas for lynx and are not likely to in the future. Most are secondary habitats such as grand fir, larch, Douglas-fir. In total, 52 acres of non-foraging lynx habitat would be converted to early successional/stand initiation that would remain unsuitable for lynx for about 15 years (Table 21). In the Savenac LAU, 7 acres of stem exclusion/other habitat would be converted to early stand initiation and an additional 7 acres would be thinned commercially, but remain a mature forest stand. Thus 3 percent of the LAU would be in an early stand initiation condition meeting NRLMD standard Veg S1. In the Wilkes LAU, 45 acres of stem exclusion/other habitat would be converted to early stand initiation and an additional 14 acres would be thinned commercially, but remain a mature forest stand. Here, only 4 percent of the LAU would be in an early stand initiation condition meeting NRLMD standard Veg S1 and maintaining large amounts of mature forest in the LAU.

Table 21. Acres of lynx habitat before and after proposed actions are complete in the Savenac and Wilkes Lynx Analysis Units (LAU).

	LAU acres of lynx habitat	Acres of primary habitat	Stand initiation ²	Early stand initiation/temp unsuitable ³	Multistory ⁴	Stem exclusion/other ^{5, 6}
Savenac Lynx Analysis Unit (LAU)						
Before	17,261	7,250	600	495	7,573	8,593
After	17,261	7,250	600	502	7,573	8,588
Change	-	-	-	+7	--	-7
Wilkes Lynx analysis Unit (LAU)						
Before	9,940	3,945	499	356	4,283	4,801
After	9,940	3,945	499	401	4,283	4,756
Change	-	-	-	+45	-	-45

Because the amount of young forest is limited to 3-4% in these LAUs, standard Veg S2 would be met. Standard Veg S5 postpones pre-commercial thinning and none is proposed in lynx habitat. The proposed action would also comply with Standard Veg S6 because all mapped mature-multistory habitats were field

² Stand initiation structural stage that currently provides year-round snowshoe hare habitat because the trees have grown tall enough to protrude above the snow in winter.

³ Stand initiation structural stage where the trees have not grown tall enough to protrude above the snow in winter but can provide snowshoe hare habitat during the non-winter months and is typically moving toward year-round snowshoe hare habitat

⁴ Multistory structural stage with many age classes and vegetation layers that provide year-round snowshoe hare habitat via dense horizontal cover.

⁵ Other – Closed canopy lacking dense horizontal cover; does not provide snowshoe hare habitat due to lack of dense horizontal cover; e.g. Stem Exclusion Structural Stage

⁶ This habitat may have included areas that were originally modeled as mature multistory, but through field verification, they were confirmed to lack either the multistory stand conditions or the dense horizontal cover needed by lynx.

verified and none were comprised of both multistory stands and high horizontal cover needed to provide high-quality lynx habitat.

Because lynx are not known to consistently use this LAU and habitat is poor, the effects on lynx habitat would be discountable and very minimal. Appendix B – Applicable Forest Plan Standards for implementation, Project-specific Design Features, and Monitoring discloses information on how standards and guidelines associated with the Northern Rockies Lynx Management Direction was incorporated and considered during project development and during this effects analysis.

Cumulative Effects

The project area is small and only limited other activities would occur – generally residential-related activities at private residences and cabins at the bottom of Cruzane Mountain. Because the project area's lynx habitat is limited and at the top of the mountain, no cumulative impacts are expected.

Conclusions and determination of effects

The project May Effect Canada lynx because:

- Lynx may infrequently move through the area
- Mature forest stands (about 50 acres), although not classified as Mature Multi-storied winter foraging habitat, would be converted to early stand initiation structure class unsuitable for lynx
- Project activities will be ongoing for 15 years

The project would not adversely affect lynx because:

- The Wilkes LAU, and in general, the Lower Clark Fork Valley are poor lynx habitat because of the mix of both unsuitable warmer, drier vegetation types dominated by pines and Douglas-fir and secondary warmer moist forests dominated by grand fir instead of primary habitats of subalpine fir and spruce. These habitats likely support fewer snowshoe hares than lynx habitats in colder, drier regions. Thus regardless of treatments or lack of treatments, lynx habitat would never be optimal and may not even be suitable at all. Habitat change would affect less than 1% of the LAU and would be discountable and very minimal.
- Observations and detections of lynx are exceedingly rare making it likely that lynx use of the project area is restricted to infrequent movements or dispersing individuals rather than year-round, successfully-reproducing occupants.
- Anticipated effects would mainly cause lynx to move to a nearby area to continue their activity. This level of disturbance is very minimal and discountable.
- The project would meet requirements in the Northern Rockies Lynx Management Direction which would maintain post-project levels of lynx habitat in the project area.

Because some discountable and very minimal effects could occur, but adverse effects are not anticipated, the project ***may effect but is not likely to adversely affect*** Canada lynx.

Because no Critical Habitat exists within or near the project area, ***no effect*** would occur as a result of the proposed action.

Wolverine – Proposed

Habitat use of the species is nearly exclusively tied to areas where spring snow is persistent into April and May (Copeland et al. 2010). These areas are used throughout the year even when snow is absent. Wolverines are widespread and population numbers are unknown although the USFS - RMRS is maintaining a database of all wolverines from which genetic material has been collected and analyzed.

No habitat for wolverine exists within or near the project area. The species is likely absent from project area. Therefore, the proposed action would not have an impact wolverine or jeopardize this proposed federally-listed/regionally sensitive species.

Regionally sensitive wildlife species

Existing data and field surveys were used to assess potential habitat, as well as known occurrences and potential for species to occur within the project area. Based on this review, there would be no impact to the following regionally sensitive terrestrial wildlife species (Table 22). Additional information regarding these effects determinations can be found in the project file.

Table 22. Regionally sensitive wildlife species not impacted by the proposed action.

Species	Status	Habitat	Anticipated effects from the proposed action
Bald eagle	USFS Sensitive	Large rivers or lakes	No impact
Bighorn sheep	USFS Sensitive	Rock cliffs and open grassland, shrubfields	No impact
Black-backed woodpecker	USFS Sensitive	Burned forests	No Impact
Coeur d'Alene salamander	USFS Sensitive	Waterfall areas, springs, talus slopes with water	No Impact
Common loon	USFS Sensitive	Large lakes or rivers	No Impact
Flammulated owl	USFS Sensitive	Mature and older open pine forests	No Impact
Harlequin duck	USFS Sensitive	Larger, fast-flowing streams	No Impact
Leopard frog	USFS Sensitive	Large water bodies with vegetation	No impact
Northern bog lemming	USFS Sensitive	Wet meadows, bogs, and fens	No Impact
Peregrine falcon	USFS Sensitive	Larger valleys, with cliff-nesting sites	No impact
Townsend's big-eared bat	USFS Sensitive	Caves, mines and mature and older open pine forests	No Impact

Species	Status	Habitat	Anticipated effects from the proposed action
Wolverine ⁷	Federally Proposed /USFS Sensitive	Areas of persistent spring snow	Would not jeopardize; No Impact

⁷ Included under Air quality in the project area is generally excellent, and the area is in attainment for all National Ambient Air Quality Standards (NAAQS). The primary source of project-related air emissions will be from prescribed fire smoke, and the main NAAQS of concern will be particulate matter (PM).

Potential project air quality impacts were calculated for PM_{2.5} and PM₁₀ using the First Order Fire Effects Model 6.5. Model results show that emissions from prescribed fire activities, including concerns about the odors, visibility and public health associated with fire, would be noticeable, but short-term, and would not exceed NAAQS limits.

Because the project would substantially reduce fuel continuity and arrangement as described in the Fuels Management presenting in the Environmental Assessment, modeling shows that if a wildfire occurred in the project area post-treatment, PM_{2.5} and PM₁₀ emissions would be reduced approximately 73- to 75-percent over the no treatment scenario.

The Forest Service annually obtains a burning permit from the State of Montana. All burns are coordinated through the MT/ID Airshed Group and the Montana Department of Environmental Quality to meet air quality standards and comply with Best Available Control Technology requirements. These requirements help limit harmful effects from prescribed fire emissions and help prevent project activities from adversely affecting or exceeding any state or Federal air quality requirements.

Scenery Resources

This section discloses the proposed actions effect to scenic resources based on the Forest Plan and the Scenery Management System handbook. Additional information is included in the project file.

The Scenery Management System handbook notes that landscapes that include both diversity and harmony have the greatest potential for highly valued scenery. Furthermore while all landscapes are viewed by someone at some time from somewhere not all landscapes are valued for their aesthetics in the same way. The existing scenic character of Cruzane Mountain and the desired scenic character for Cruzane Mountain discuss the differences in the aesthetic today as well as valued attributes that can better exhibit diversity and harmony on the Cruzane Mountain landscape.

Table 16. Scenery resource element, indicator and measure to assess effects.

Element	Indicator	Measure
Scenic character	Management activity deviations from visual quality objectives	acres that meet or exceed visual quality objectives

Source: Visual Management System and Scenery Management System Handbooks.

Existing Scenic Character and Integrity

The existing scenic integrity of Cruzane Mountain is that it is meeting or exceeding the visual quality objectives as described in the Forest Plan. There is little to no evidence of management action deviations and the area appears natural or unaltered. However there is also little replication of the true ecological condition within the historic range of variability. There is little evidence of the diversity in age classes, vegetation types, open and closed canopy texture, and color variety to appear natural within the ecological range that is appropriate for the area. The homogenous canopy does create a pleasing and complete

appearing landscape with regards to form, line, color, texture, and pattern but the color, texture and pattern in particular are not within the historic range of variability for the ecosystem. This flat, monotone composition does not reflect the diversity and variety that might have been created in the past when there was less influence of management decisions to reduce the influence of fire and to stock stands with inappropriate vegetation species. There is little to no mixture of form, line, color, texture, and pattern. Cruzane Mountain appears as a dark forest green, soft flat-topped dome with a consistent flat and uniform appearance.

Direct and Indirect Effects

Forest Vegetation Harvest

The proposed action should not cause substantial direct or indirect effects to the scenery resource because of project design (Appendix B) to reduce the scenic contrast between the management activities and the scenic character of the area. Table 17 discusses the concern for specific units within the project area based on their visibility and visual quality objectives. All of the units identified in this table require design features to meet or exceed their visual quality objectives in the long-term. Most of the units within the table are those within the retention visual quality objective. In these units implementation of the management activities proposed would change the appearance from the existing condition. Since the existing condition is one of natural appearance, change may be presumed to appear unnatural, but the design features are proposed to reduce or eliminate the unnatural appearance albeit still a changed appearance. In the short-term some of these activity driven changes may diminish attainment of the retention visual quality objective until planted saplings and natural regeneration growth occurs to better diversify the appearance and fully replicate the ecologically appropriate form, line, color, texture and pattern of the landscape. The scale of the units as well as the scale of the openings within these units is larger than the existing condition scale of openings but these openings are within scale of one another and within the scale of openings within the historic range of variability for the ecosystem. In the long-term these units should meet or exceed this visual quality objective and become more scenically stable by reducing the risk of a large-scale alteration to the scenic landscape which could diminish the scenic character and appear unnatural. Likewise, some of the rest of these units would not meet their partial retention visual quality objective in the short-term but in the long-term the vegetation diversity in structure, form and texture should increase the scenic variety and create a more stable scenic composition. These units are expected to meet or exceed the partial retention visual quality objective and better retain the scenic character of the area in the long-term.

The proposed action may benefit the scenic character by increasing the scenic stability of the area by moving project area acres toward meeting or exceeding their visual quality objectives in the long-term. Reducing overstocked stands, reducing insect and disease infestations, and reducing the fire risk within the area should indirectly benefit the scenic stability of the project area including those acres not treated by reducing the risk of a large scale alteration to the scenic landscape. The form of the area overall is likely to be retained as are the individual stands where the shape and scale of their forms would be natural and influenced by burning and leave tree clumping. The collective color of the area would likely be altered to have less cumulative dark forest green, but the altered colors would be natural in appearance and repeat the existing exposed soil colors and the lighter understory vegetation color as well as some additional seasonal color from larch stands. This variety should appear harmonious and natural in the long-term. Design features to replicate the shape and scale of openings to those of either the existing condition or the historic range of variability should help reduce the contrast and allow visual disturbances to remain subordinate and create an aesthetically diverse composition across Cruzane Mountain. Treating

the entire mountain with a variety of treatment types should create a more harmonious appearance than treating in a discordant manner in which some areas are and some areas are not treated. This is especially true on the south facing side of the mountain where almost all of the south face would experience management activity. Those areas that do not experience treatment would serve as further mosaic again due to the retention of the dark forest green color, closed canopy form and texture of these areas. When seen in total the area should appear diverse yet connected and complete.

Table 17. Units, their prescriptions, logging systems and visual quality objectives and applicable design features to ensure the unit management activities would meet or exceed their visual quality objective.

Unit ¹	VQO ²	Prescription	Logging System	Concern
4 ³	Retention	Regeneration	skyline	Not visible from concern level 1 travelway or location. Reduce edges especially between non-treatment areas to the south, east and north. Part of greater than 40 acre opening; units 5 and 6 are likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
5	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
6	Retention	Commercial Thinning	skyline and tractor	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
7 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Burning may help reduce discernibility of edges and transition into other treatment areas. Part of greater than 40 acre opening; units 5, 6, and 8 are likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
9 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Natural regeneration by leave trees should diversify the texture and pattern of the unit. Burning may help reduce discernibility of edges and transition into other treatment areas. Part of greater than 40 acre opening; unit 8 is likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
10 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Burning may help reduce discernibility of edges and transition into other treatment areas. Part of greater than 40 acre opening; unit 8 is likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.
11 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Burning may help reduce discernibility of edges and transition into other treatment areas. Part of greater than 40 acre opening; unit 8 is likely to reduce discernibility due to mosaic of treatments and higher basal area in those units creating a more closed canopy appearance.

12	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
13	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
14 ³	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Part of greater than 40 acre opening, with no adjacent intermediate treatments to serve as feathering. Reduce edges especially between non-treatment areas to the south and downslope. Burning between this unit and units 12, 13, and 15 to reduce the likelihood of unnatural appearance in untreated areas between these units.
15	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Reduce edges especially between non-treatment areas on all sides. Burning between this unit and units 12, 13, and 14 to reduce the likelihood of unnatural appearance in untreated areas between these units.
16	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
17	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Reduce edges especially between non-treatment areas on all sides. Burning between this unit and units 14, 15, and 70 to reduce the likelihood of unnatural appearance in untreated areas between these units.
18	Retention	Regeneration	skyline	Only southeastern corner is visible. On this side burn between this unit and units 20 and 70 to reduce discernibility of an unnatural line between the treatment area and the no treatment area.
19	Retention	Regeneration	tractor	Only northwestern corner is visible. On this side burn between this unit and units 20 to reduce discernibility of an unnatural line between the treatment area and the no treatment area.
20	Retention	Commercial Thinning	skyline	Visible from Interstate and Milwaukee Grade Trail. Reduce the discernibility of corridors via burning and narrowing of the corridors.
41	Partial Retention	Regeneration	skyline	Visible from private properties and travelway accessing these properties. Reduce edges especially between non-treatment areas to the south and east. Create leave tree clumping when possible. Natural regeneration by leave trees should diversify the texture and pattern of the unit.
49	Partial Retention	Commercial Thinning	skyline	Visible from private properties and travelway accessing these properties. Reduce the discernibility of corridors as viewed from the private properties. Align them so they are not directly perpendicular to up-down slope of the hill as viewed from private property.
56	Partial Retention	Intermediate	skyline	Visible from private properties and travelway accessing these properties. Reduce edges especially between non-treatment areas to the south and east. Create leave tree clumping when possible.
66	Partial Retention	Regeneration	tractor	Visible from private properties and travelway accessing these properties. Reduce edges especially between non-treatment areas to the south and east. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture.

70	Retention	Regeneration	skyline	Visible from Interstate and Milwaukee Grade Trail. Create leave tree clumping when possible. Planting in irregular pattern to create a mosaic texture. Reduce edges especially between non-treatment areas on all sides. Burning between this unit and units 16, 17, and 18 to reduce the likelihood of unnatural appearance in untreated areas between these units.
27, 28, 30, 31, 32, 42, 57				In Retention but not visible from a concern level 1 travelway or location. If these units expand or are altered further review to ensure they would meet the retention VQO may be necessary.
Burning unit on westside of project area				Use topography to hold lines on all edges to reduce introduction of unnatural lines into the area visible from private lands.

¹All other units do not have high concerns for meeting or exceeding their visual quality objectives.

²Some units have more than one Visual Quality Objective (VQO) within them. In those cases the more restrictive VQO is listed.

³These units are part of Large Opening (greater than 40 acres number 3)

Source: Scenery analysis, visibility modeling and assessment of effects.

Table 18 highlights the units where short-term effects from management actions are likely to occur that would change the scenery resource from its existing condition. This change would appear in contrast to the existing condition but should appear harmonious and mosaicked in total. With the design features applied these units should appear natural and the management activities remain subordinate in the long-term.

Table 18. Units of Concern for scenery resource impacts in the short and long-term.

Units with Short-term Effects to Scenery	Units with Possible Long-term Effects to Scenery
7, 10-15, 17, 20, 70, 41, 46	7, 10-15, 17, 20, 41

If the design features are implemented the form, line, color, texture, and pattern of the project area should meet or exceed the Partial Retention and Retention visual quality objectives in the long-term. In the short-term the likely discernible effects would be stumps, blackened trees, exposed soil, discernible roadways, and possible linear corridors from skyline harvesting intermediate harvest units. Design features to reduce the impacts of these management activity remnants, should improve the aesthetic quality and reduce the discernibility. In the long-term vegetation growth would diminish the discernibility of these remnants and the increased diversity in species composition, structure and classes should increase the diversity of the scenery in a harmonious way that is aligned with the historic range of variability for this ecosystem. The addition of different vegetation species, especially larch, could increase the seasonal color variety in the area as well as the general color composition all year round. The vegetation diversity should also increase form, texture and pattern variety as well. Structural shifts to more age classes and more diversity in canopy density should also increase the variety of the landscape and maintain a more stable scenic character.

Greater than 40 acre openings

These large openings would create a change to the existing visual composition of the area especially opening 1 and 3 which are visible from Interstate 90 and Milwaukee Grade Trail. This size opening is aligned with the historic range of variability for this ecosystem from the effects of fire. While these areas may create a contiguous 40 acre opening, there would be variation in canopy cover within them, especially in the long-term once planting has begun to restock the areas with a more diverse species composition and age class composition. The plantings would include three species, increasing the diversity of tree composition as well as potentially fall color where the larch plantings occur, creating

appealing seasonal visual interest. There are also likely to be leave trees especially in the intermediate harvest portions of these large openings which would break-up the appearance of non-canopy cover as well as provide vertical variation in the landscape's appearance. Introducing this size openings in the canopy would create a more sustainable scenic composition as well as create scenic diversity in a harmonious way by creating multiple of these larger openings. Furthermore these openings would better integrate this project area scenically into the landscape to the east, where other open, canopy-free areas are more frequently occurring.

Roads

The new 4 miles of road are not in visible areas from the concern level 1 travelways and locations. The reconstruction of the existing road through unit 16 to unit 4 is visible and would likely become more visible post-harvest of the units it travels through. In particular the section between units 7 and 9, 10 and 11 would be visible since these units are regeneration harvest units which would expose all terrain around the road. To the extent feasible leaving trees on the downhill side of road within these units is desired to meet or exceed the retention visual quality objective in the long-term. This road reconstruction is not likely to meet the retention visual quality objective in the short-term in association cumulatively with the surrounding units' treatments.

Cumulative Impacts

Timber harvest occurred over approximately 30 percent of the project area from the 1950s to present. The impacts of these past harvests on the scenery resource are generally indiscernible at this point in time. Overall the pattern, texture and color of the project area are dominated by naturally appearing features. There is a bit of discernible evidence of this previous management action when viewed from the south side of the St. Regis River and Interstate 90 but it is not dominate. The most discernible feature is some linear corridors where the canopy is more open than in other areas. However a viewer observing the project area from a viewing platform east of the project area and looking west would perceive the distinctly linear hard edge formed at the boundary of the forest service land and private lands on the south side of the St. Regis River and Interstate 90. This location is outside of the project boundary but overlaps in time and space for the cumulative effects of the project actions for the scenery resource. While the management actions within this project would not diminish this discernible boundary actions in this project area could diversify the canopy within the viewshed of the project area. This may lessen the appearance of this discernible boundary by reducing the dark v. light contrast cumulatively. This is not to say that introducing new hard edge linear features is desirable. Management action design features to emulate natural forms, lines, patterns and textures is desirable within the project boundary to better integrate the management actions to the overall scenic character of the area.

As discussed in the No Action Alternative (page 84) effects historic fire suppression in the area has create an at risk scenic composition. The scenery of the area is deemed to be aesthetic but at risk to a landscape altering event due to the vegetation structure and composition not being within the historic range of variability. The proposed action may reduce the susceptibility of the entire Cruzane Mountain landscape to as extreme an alteration under such an event. The scenic stability of the scenic character is likely to increase due to the proposed management activities. The aesthetics of the area are likely to change due to the activities especially in the short-term but the aesthetics are likely to be more stable long-term, such that they can be maintained in a diverse and harmonious composition into the future. In the long-term all acres in the project area should meet their visual quality objectives.

The proposed action *may impact individuals but is not likely to contribute to a trend to federal listing* for boreal toads, fishers, and gray wolf.

Boreal Toads

Specific to boreal toads, upland habitat in the project area (3,790 acres) is suitable for boreal toads (as most upland habitats are). Although breeding wetlands may exist along Packer and McManus Creeks or the St-Regis River, no breeding wetlands are specifically known. Also, some of the springs and seeps in the project area may be quite suitable for breeding.

Because toads can use nearly any upland habitat, thus pre- and post-treatment forest conditions likely make no difference to their use. Thus the potential project effects are based mainly on the amount of direct mortality caused by mechanical activities during the project. Because the project would not impact breeding wetlands or streams, these were not considered. A qualitative discussion of the potential mortality of adults from logging machinery was used.

Commercial and non-commercial vegetation management is proposed for 1,503 acres within the project area. These activities could cause direct mortality of toads in the project area, but would likely be limited for the following reasons:

- Because of the widespread nature of toads, logging machinery would not affect entire areas, only skid trails, skyline corridors etc. not every acre of land in the project area, and likely only 1-2 units in the project area would be operating simultaneously.
- The nocturnal nature of toads would reduce mortality risk because they are resting below ground during the day would be more protected from potential harm.
- Toads use riparian areas and stream channels more often than upland areas (Schmetterling and Young 2008), thus streamside buffers would reduce impact risk to toads.

Considering these risks, the widespread nature of boreal toads, streamside protections, and lack of wetlands/breeding areas affected, direct impacts would be limited to a small number of individuals.

Indirectly, changes in habitat from harvest or prescribed fire would likely have a minimal impact on toads because toads are able to use habitats ranging from moist forests to grasslands. Thus indirect effects from habitat change caused by prescribed fire or harvest may slightly change how toads use habitat, but these changes are expected to be immeasurable.

Table 19. Resource indicators and measures for proposed action.

Element	Indicator	Measure	Effects
Scenic character	Management activity deviations from visual quality objectives	Acres that meet or exceed visual quality objectives	In the short-term approximately 237 acres may not meet or exceed. This is about 6% of the project area. 3,553 acres should meet or exceed in the short and long-term. In the long-term all acres should meet or exceed with design features applied

Source: Fieldwork and analysis.

Terrestrial Wildlife

Cumulative effects of past, future and off-site mechanical activities also likely cause a low level of mortality for toads. Overall, however, the west zone of the Lolo National Forest has a maximum of about 800 acres of timber harvest units ongoing on any particular day (e.g activity is occurring within almost 20, 40-acre units). This area of disturbance represents about 0.08% of the Lolo National Forest West Zone. Similar disturbances are occurring on small areas of state, corporate, and private land tracts throughout Mineral County. These mortality sources are likely absorbed by toads' very high reproductive rate (one pair may produce thousands of offspring each year), thus there is low likelihood of negative impacts realized at the population level.

Fisher

Habitat use of the species is related to moist, mature forests with abundant structure in the form of large, down logs and more than one canopy layer. Research indicates that a minimum of forest openings is most beneficial for fisher habitat (Sauder and Rachlow 2014). Habitat in the project area consists of drier forests on the South side of the mountain which likely are unused by fishers. On the north side of Cruzane Mountain, more moist forests predominate, however, these stands originated in 1910 and have little complexity. These single-story stands serve as relatively poor fisher habitat. Some areas in the bottom of Packer and McManus Creeks and on the western side of the project area where spruce is more dominant or where lodgepole pine has died and is being replaced by other species are transforming into higher-complexity fisher habitat.

A relatively small proportion of the project area is good habitat (e.g 5-10% complex, overmature forest). This area of Montana is on the edges of the most highly suitable fisher habitat in the Northern Rockies, which is within Central Idaho. In this area, habitats are more often marginal, and patches of habitat are generally smaller (note Fisher habitat model in (Olson et al. 2014). According to their model, about 890 acres (23%) of the project area has a high likelihood of serving as fisher habitat and 786 acres (21%) has a moderate likelihood.

Fishers are widespread. Although the US Forest Service Rocky Mountain Research Station maintains a database of all fisher from which genetic material has been collected, population numbers are not well established. The nearest possible known occurrences include a suspected track observation 5 miles north of the project area near the junction of the Hill 7 Trail and National Forest System road 16807. DNA was collected in Ward Creek on a fisher in 2016, which is about 12 miles southeast of the project area. These observations indicate possible presence of fishers in the project area. MT Fish, Wildlife, and Parks conducted a distribution study of fishers in 2019 across their suspected range in Montana, no fishers were detected in or near the project area in this effort.

Project activities, road and vegetation management, have an exceedingly low likelihood of killing or injuring a fisher because they are very unlikely to be using the project area. They also have the ability to simply move away from the noise, machinery, or vehicles and no further effects would result.

Indirectly, the proposed action would remove some suitable habitat in portions of vegetation treatment units proposed for regeneration harvesting, commercial thinning, and fuel break treatments (Table 23). In regeneration harvest units, a reduction of available fisher habitat would result by converting mature, forested stands into seedling age class stands with limited forest cover which are unsuitable for fisher. This effect results is likely to have a small negative impact on fisher use of the project area because these areas consist of only about 5% or less of a fisher home range. These areas would become useful habitat again to fishers in 40-80 years post-treatment.

Table 23. Effects of proposed action on modeled probability of fisher habitat.

Fisher Habitat	Existing habitat in project area (acres)	Proposed Regeneration Harvest (acres)	Proposed commercial thin/ fuelbreak⁸ (acres)	Percent Remaining
High Probability	890	235	68	66%
Medium Probability	786	319	42	54%
Total	1,676	554	110	40%

Additionally, 68 acres of high probability habitat would be receive a partial harvest (Table 23). Although these treatments retain some level of habitat, they simplify forest structure and reduce canopy cover both of which reduce habitat quality for fishers.

This reduction in habitat from both types of treatment would not impact viability because the best available habitat model data (Olson et al. 2014) identify only the area south of Interstate 90 as critical for maintaining a long-term population.

The project area is outside of the identified core area in Idaho and does not have abundant fisher habitat compared with areas further southwest toward the core area. The project area's distance from the core habitat in central Idaho especially and from the more suitable areas southwest of Interstate 90 makes its value in maintaining a viable population very low. There are approximately 706,611 acres of high or moderate fisher habitat within the boundary of the Lolo National Forest. This project area only contains about 1,676 acres (0.2%) of the fisher habitat on the Lolo National Forest.

With respect to cumulative effects, only one vegetation management project (Salty Borax) is likely to occur within the cumulative effects area in the next 10 years. This project could harvest timber to a scale approaching 5,000-10,000 acres which could cause another small decrease in available fisher habitat. This project would also be on the periphery of the fisher range mapped by (Olson et al. 2014) and thus not have substantial population-level impacts leading toward federal listing. High vehicle travel on Interstate 90 would also cause a high likelihood of mortality with cars over time, but the extent that this would affect the populations is unknown.

Gray wolf

Habitat needs center mainly around an adequate prey base of mainly ungulates, although other species can replace ungulates during some periods of time. Excessive mortality (e.g. poisoning and bounty hunting) can result in wolves avoiding areas where vulnerability to humans is high. The entire project area could be used by wolves. The quality of habitat is moderate to high because of abundant deer and elk, however, the area is small and only likely to provide for a portion of a wolf pack needs through a year.

During walk through surveys of the area in 2018 and 2019, wolf sign was observed but no wolves. Wolf numbers are monitored by MT Fish, Wildlife, and Parks (MTFWP). Populations have been leveling off after several years of increase. Wolves are currently hunted and trapped legally by MTFWP and managed as other game species in Montana. In 2017, a total of 13 wolves were harvested from Hunting

⁸ The precommercial thin and low severity prescribed fire units were removed from the impacts to fisher habitat because these units are young stands which are too small or dry habitats which do not support the characteristics of fisher habitat.

District 200 (which includes the project area) and 21 were harvested in 2016. Given this management of wolf populations within the state, a certain level of mortality is anticipated and desired for maintenance of populations at a level acceptable to the State of Montana.

The proposed action would not change conditions for wolves. The proposed action would not change the availability of ungulates because their home ranges are much larger than 3,790 acres. The proposed action would impact no den or rendezvous sites because these sites are monitored by MTFWP and none are known in the area. The proposed action would not cause any changes in road densities that could affect wolf mortality. It is remotely possible that wolves moving through the project area during a project work day could be disturbed and move away. This movement is unimportant because moving ½ mile would bring wolves far from the influence of the project and wolves normally move several miles in a day. The changes in habitat with harvest are also unlikely to have any effects on wolves because they can use open and forested lands in prey is available. Thus activities in the project area are highly unlikely to affect any wolves except for a remote possibility of disturbance and ample habitat exists around the project area. This would result in likely no mortality, compared to the 10-20 removed in the Hunting district each year.

Because the direct and indirect effects are undetectable, no cumulative effects are anticipated.

Management Indicator Species

Northern goshawk, elk, and pileated woodpecker are designated as management indicator species per the Forest Plan. The Forest Plan states that these species will be monitored because they are sensitive to management actions or are of special concern.

Elk

The elk is a Management Indicator Species for the Lolo National Forest used to gauge impacts on all big game species. The health of its population was supposed to indicate the condition of populations for other wildlife species using similar habitats on the Lolo National Forest. Elk use a large variety of habitats including many of the younger successional stages created after fire or timber harvest. Because of wide habitat use and other impacts (e.g. hunting, diseases, predation, winter weather severity, winter use on other land ownerships), elk population fluctuation may not reflect habitat conditions on the Lolo National Forest very well. None of the project area is identified by Forest Plan to be managed specifically for elk habitat values.

The project area covers less than 10 percent of Hunting District 200 and falls within the Lower Clark Fork Elk Management Unit. The goals for the elk population within this Management Units are to: maintaining elk numbers, a diverse bull age structure, and a variety of hunting opportunities (Montana Fish Wildlife and Parks 2015). This requires secure habitat areas in summer, controlling vulnerability from hunting, and providing winter range sufficient to support elk when little forage is available.

Habitat quality is high for summer range within the project area for several reasons. There is lesser amounts of disturbance because of the limited human population nearby. The area serves mainly as calving, summer, and transitional range in fall. Winter use does not occur except during very low snow years. The entire project area is used by elk throughout most of the year, with little winter use.

Elk numbers are monitored by MTFWP and fluctuate some each year. There have been no noticeable up or downward trends in recent years and hunting regulations have remained relatively stable. Several walk-through surveys of the area have occurred through project planning. There was no observations of elk although elk sign was observed in several locations. Elk wallows were also observed during several USFS surveys of the area.

The highest priority in managing summer range is to produce and maintain high quality forage (see (Ranglack et al. 2014), which can be done through opening dense forest stands and allowing increased grasses and shrubs to grow. This can be accomplished through timber harvest. Prescribed fire after harvest, or instead of harvest, increases forage quality because of the nutrients added to the soil from the fire ash and the removal of dead material.

Table 24. Habitat characteristics within the project area specific to elk habitat effectiveness (summer range forage quality and human access in summer) and elk vulnerability (human access/hunting pressure in fall).

	Existing Condition (acres)	Additional with the Proposed Action (acres)	Total
Forest Openings ⁹	274	981	1,255
Open Forest Stands ¹⁰	191	530	721
Acres of forage improvement ¹¹	0	1,161	1,161
Miles of open motorized route in the project area ¹²	19.7	19.7	19.7

Open areas would increase from about 7% (274 acres) to about 33% (1,255 acres) of the area (Table 24). This would increase forage availability, but also increase vulnerability to hunters during the general rifle season. Coupled with the partial harvest proposed, about 51% of the area would be much more open stands ranging from very few trees per acre (5-10) to thinned stands with many more trees, but high visibility for hunters.

Although cover for elk would be reduced in the proposed action, vegetation management was planned to provide adequate cover for elk through project implementation:

1. Known areas with high amounts of elk use were omitted from harvest units, especially high use summer range areas.
2. As required in the Forest Plan, all wallows were protected with a 5-8 chain (300-500' buffer).
3. Untreated forested areas were spread out across the project area, such as near the western side of the project area, Cruzane Gulch, and the northeast edge of the area.
4. The project would be divided into 3 subunits (South, West and East) to avoid high levels of disturbance across the whole area at once.
5. Commercial thinning units create a large patch of partial harvest in the center of the project area to avoid continuous open forest conditions over a wide area.

The increased open area would likely result in an increased number of elk killed during the next 10-15 rifle seasons and contribute an extra 1-3 brow-tined bulls each year. Alternatively, the increased available forage from harvesting and prescribed burning would improve body condition of 10-30 cow elk during that same time period resulting in a greater number of calves to sustain the population. These provisions, in total, would adequately maintain the elk population in the area into the future.

In consideration of cumulative effects within Hunting District 200, limited harvest has occurred and no large fires have occurred in the west end of the Superior District for several years, therefore, forest

⁹ Existing condition acreage based on R1 VMAP data where lifeform is classified as herb, shrub, or spveg (sparse vegetation). Additional acreage with the proposed action includes regeneration harvest treatments.

¹⁰ Existing condition acreage based on R1 VMAP data where lifeform is Tree Canopy ranges from 10-25 percent. Additional acreage with the proposed action includes partial/intermediate harvest and mixed severity fire.

¹¹ Additional acreage with the proposed action includes low severity fire.

¹² Includes portions of Interstate 90, as well as open NFS roads for public use and county roads.

openings created by this project are not anticipated to cause concerns with respect to associated cumulative effects. In recent years, other projects in the Hunting District have included road reconstruction and changes in allowed motorized use. These increases add to the vulnerability and hunting pressure on elk that may use the project area. Considering these existing more recent changes with implementation of the proposed action, there is an increase in vulnerability a small degree. Most of these routes are closed in summer, habitat effectiveness (habitat use in summer) would change very little if at all. No changes in motorized use is proposed for this project.

Overall, increase vulnerability is reduced through project design and increased forage helps to offset increases in vulnerability to maintain a stable population through time. The proposed action would maintain sufficient habitat for elk to continue to provide hunting and viewing opportunities anticipated in the Forest Plan.

Northern Goshawk

Goshawks use mature to old growth forests for nesting in most cases, but use a variety of forested and open stands for foraging. Old growth is not present in the analysis area although there is 589 acres of potential old growth. However, habitat quality within the project area is high because the project area consists of closed-canopy forest with larger trees and abundant structure to provide prey species for foraging. There are no areas of early successional habitats identified as a portion of foraging habitat (Reynolds et al. 1992). Given the existing condition of habitat within the project area, goshawks likely use the area for nesting and foraging (Table 25). The entire project area could be used and is about the size of 75% of one goshawk pair home range.

Table 25. Overview of goshawk habitat components within the project area.

	Acres	% of project area	Acres recommended per home range area (from (Brewer et al. 2009)
Nesting Habitat	1,596	42	240 (up to 6-40-acre stands)
Foraging Closed/ Forested	1,947	51	3,032 (80% of project area see table 3 pp14) – Note – nesting habitat also functions as Foraging Closed, which totals about 93% of project area
Foraging Open	216	6	758 (20% of project area – see table 3 pp14)

In order to better balance recommendations for goshawk habitat specified in (Brewer et al. 2009) and internal citations, increasing open, foraging habitat by over 500 acres would be appropriate. Also, decreasing nesting habitat by intermediate harvest and in turn increasing forested foraging habitat by about 1,300 acres would easily maintain recommended forest conditions for goshawks. The proposed action would continue to provide sufficient nesting habitat and a mix of forest successional stages to support goshawks in the future.

In regards to cumulative effects, the direct and indirect effects would maintain sufficient goshawk habitat. No additional activities are planned nearby that would remove large quantities of goshawk habitat.

In conclusion, the proposed action may impact individuals or habitat, but will not cause a trend toward federal listing. Habitat would change, nesting habitat would be lost, and foraging habitat would move toward a more appropriate balance of successional stages. However, sufficient nesting habitat would remain and any direct mortality is unlikely.

Pileated woodpecker

The pileated woodpecker is a Management Indicator Species for the Lolo National Forest used to gauge impacts on mature old growth forests with limited management. The health of its population was supposed to indicate the condition of habitats for other wildlife species that use components of old growth such as large snags and mature, decaying trees.

Pileated woodpeckers use a wide variety of habitats including open and closed forest stands, agricultural and rural areas and older forests. Samson's 2006 (Samson 2006 and pileated woodpecker in the Northern Region, Samson, 2006) habitat model focuses on the presence of trees 10" or larger in diameter for foraging and 15" and larger for nesting. Larger, dead trees provide carpenter ants (a primary food source) and enough space to create roosting or nesting cavities. These trees can be used individually for foraging in areas with very few large trees, or in areas with a larger density of high quality foraging trees, pileated woodpeckers may select as nesting areas.

The entire project area could be used. Within the project area, there are many larger trees ranging from western larch on the top and northern side of the mountain to ponderosa pine on the south aspects. Larger spruce and fir trees are present along East Fork of Packer Creek. The pileated woodpecker is considered widespread and common globally (G5), but a species of concern in Montana because of its limited or declining numbers or habitat (S3). However, the species is apparently reasonably common on the Lolo National Forest according to the Northern Region Landbird Monitoring Program. The species has been observed within the project area in 2018 and 2019 south of Cruzane Gulch.

Direct effects on individuals would include only disturbance or displacement of 1-4 birds from a stand. The birds would likely move to an adjacent stand and continue foraging. After being exposed to logging machinery for some time, birds may become somewhat habituated and return to closer distances from machinery.

The number of larger trees would be reduced across the project area as healthy, desirable trees are retained. The average size may increase because smaller trees are removed and larger trees are retained. Although nesting-sized trees (>15") would still be abundant in the area, some level of suitability for the species would be reduced because of fewer trees and distribution.

Nesting habitat is defined in Samson (2006) as simply areas with trees >15" dbh. Although these are likely required, observations of pileated woodpecker nesting usually occurs in denser forests with these large trees and an abundance of trees used by carpenter ants, such as observed on the ridge south of Cruzane Gulch. In the proposed action, the Cruzane Gulch area would be mainly protected by the excluding units as part of the proposed action refinement for elk habitat considerations and riparian habitat conservation areas. Adjacent timber harvesting and prescribed burning may cause the woodpeckers to increase use of the Cruzane Gulch habitat, but is not likely to cause abandonment of the area.

In consideration of cumulative effects, no decrease in the population is anticipated. Existing habitat would continue to be provided in the most heavily-used part of the project area. Some reduction in use of the harvested portions of the project is expected, but habitat would still remain. Samson (2006) identifies habitat as the presence of 10-15" dbh or larger trees and this would remain throughout all of the project area after treatment. No other large projects or activities have reduced cover of larger trees in this portion of the Superior District thus no other cumulative effects are anticipated.

Migratory Birds

In accordance with Executive Order 13186 (2001), Federal agencies are required to minimize negative effects to migratory birds. Additionally, the Migratory Bird Treaty Act of 1918 protects species from

hunting and overexploitation. “Migratory birds” include over 100 species ranging from ducks and aquatic birds to grassland and high-elevation forest-dependent species. Because this species group is so diverse, precise predictions about potential effects are nearly impossible, and both “no action” and any proposed actions have effects on the relative abundance of various species, essentially any action would benefit individuals of some species while harming individuals of other species. Thus the Northern Region Sensitive Species Listing Process is critical at identifying species which may need more management attention than others because of rareness or changes in habitat abundance. For other migratory bird species, maintaining a mixture of vegetation types and age classes can help provide for a diversity of species through time. The project will maintain this mix of species and age classes and actually return the project area to a condition (more open, more ponderosa pine) that better matches with the historical condition and therefore would benefit the largest array of migratory birds.

Snag Densities

Snag abundance on the Lolo National Forest exceeds requirements in the Forest Plan, Appendix N and the Lolo Dead and Down Guidelines (U.S. Department of Agriculture 1997). However, these guidelines were written for retention in timber harvest units where snag densities would be very low. Snag densities across the Lolo National Forest, on average, are far above requirements and should provide habitat for snag-dependent species. Other indicators, such as breeding bird survey data, observations of woodpeckers in formal and informal surveys across the Lolo Forest also corroborate that snags are abundant enough to support populations of these species.

Within the proposed action, the requirements of Lolo Forest Plan Appendix N would be followed to retain snags within treatment units. Many green trees would be retained during harvest to provide seed for young trees, provide shade and shelter for regenerating trees, and provide some cover for wildlife. After harvest, these units would be burned resulting in the death of some of these trees and a future crop of snags for species using snags. Within untreated areas (especially Cruzane Gulch), as forests age, snag densities increase which would help support species which use snags. Prescribed fire on the South side of Cruzane Mountain would knock over and consume some existing snags but kill new trees resulting in future snags.

Noxious Weeds

Noxious weeds are a serious threat on the Lolo National Forest and they are increasing and expanding their range (USDA). The term “noxious weed” as defined by the Plant Protection Act of 2000 means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. Noxious weeds have an impact to wildlife habitat quality, soil and water resources, and native plant habitat and diversity. Noxious weeds are usually associated with disturbance factors, but the reality is that some plant communities are at risk to invasion even in the absence of man-created disturbances.

This analysis focused on how the proposed management activities would affect the susceptibility of native plant communities to the establishment and spread of noxious weeds. Additional information about methodology, data sources, and other information supporting the conclusions summarized here can be found in the resource report in the project file.

Measurement indicators were used to assess a project’s probability of contributing to the establishment, spread and persistence of noxious weeds.

Table 26. Resource indicators and measures associated with understanding the impacts of noxious weeds.

Resource Element	Resource Indicator and Measure
Effects of harvest on the risk of weed establishment and spread	Number of acres of soil and canopy disturbance due to harvest
Effects of road work on the risk of weed establishment and spread	Number of acres of road work at high risk of weed establishment and spread

Activities which create canopy openings, reduce cover of competing vegetation or create favorable soil conditions such as newly exposed soil surfaces and increased nutrient availability are known to make sites susceptible to new or increased existing weed populations (Erickson and White 2007). All proposed activities that have on-the-ground disturbance would be evaluated regardless of their distance to known infestations because weed seed is transported by a multitude of carriers and an ample seed bank exists relative to sites proposed for activity. Factors limiting the spread of weeds on moderate and high-risk sites are: shade from tree canopies, higher soil moisture, needle and grass litter that provides a mulch-like covering of the ground, lack of exposed soil and native plant competition. Any activity that decreases any of these factors has the potential to introduce, establish, accelerate the spread and increase the persistence of noxious weeds.

The analysis area boundary for this effects analysis focused on implementation sites for the proposed on-the-ground activities such as vegetation management, road maintenance and associated activities such as timber hauling. The time span for looking at effects of the proposed action is over the 10 years following the beginning of project implementation.

St. John's wort (*Hypericum perforatum*) is the most widespread weed within the project area. This noxious weed species is found on the roads and on the open, drier south aspects within the analysis area. Oxeye daisy (*Chrysanthemum leucanthemum*), meadow hawkweed complex, (*Hieracium pretense*, *Hieracium floribundum*, *Hieracium piloselloides*), and spotted knapweed (*Centaurea stoebe*) are present within the analysis area and are found mostly in the road corridors with some incursions under the forest canopy

Direct and Indirect Effects

Forest vegetation management

All of the proposed vegetation management units are assumed to have, to varying degrees, established weed populations adjacent to their boundaries, mainly along existing roads. All three noxious weed species known within the project area prefer growing in full sunlight in dry gravelly or sandy soils, although hawkweed would tolerate shade better than knapweed and St. John's wort.

At varying levels, forest management activities reduce canopy cover and increase the amount of available light penetrating to the forest floor. The existing forest floor vegetation, including any present weed populations, would respond positively to this increased light.

Following harvests, the remaining tree canopy cover would eventually increase and fill in the gaps created by the tree removal as the trees respond to the increase in light, moisture and nutrients from the removal of competing trees. This response would eventually limit the amount of available light reaching the forest floor, thereby slowing the growth of the forest floor vegetation. The more canopy cover that is initially removed, the greater length of time it would take the trees to fill in the gaps and limit the amount of light. Reforestation of regeneration harvest units would accelerate the re-establishment of canopy cover, decreasing the susceptibility to weed establishment.

There are 981 acres (38 percent of total proposed vegetation treatments) of regeneration treatments. These harvests would reduce the amount of canopy cover by approximately 80-100 percent within treatment units. If weeds are present and adjacent to these disturbed areas, the risk of weeds establishing and spreading is **moderate to high**. Considering commercial thinning and improvement cuts (430 acres, 17 percent of overall proposed vegetation treatments), these vegetation treatments would reduce the amount of the canopy cover by approximately 40 to 60 percent within treated areas. If weeds are present and adjacent to these disturbed areas, the risk of weeds establishing and spreading is **low to moderate**.

Road management activities – new road construction, reconstruction, maintenance, decommissioning and temporary roads

A study by Birdsall and others suggest that roads contribute more to the spread of weeds than silvicultural treatments (Birdsall et al. 2012 Ward W., Runyon, Justin B. 2012 Roads impact the distribution of noxious weeds more than restoration treatments in a lodgepole pine forest in Montana, U.S.A. Restoration Ecology Vol 20, No 4, pp 517-523). Any road activity such as temporary road construction, or existing road reconstruction, maintenance, has the potential to contribute to the establishment and spread of weeds.

Temporary road construction has the potential to contribute to weed spread by removing the vegetation and by moving large amounts of dirt and disturbing the ground to excavate a road. When the harvest is completed, the road is then obliterated and re-shaped to original contour, thus disturbing the soil again. These actions to build and obliterate temporary roads create the soil disturbance conditions needed for germination of seed, whether native or non-native. If weeds are present, the risk of weeds establishing and spreading is high.

Of all the roadwork in the project, road reconstruction/maintenance encompasses the most road management activity acres. These activities include brush removal, blading, ditch cleaning and installing drainage dips, has the potential to contribute to weeds spread by removing vegetation from the road surface and disturbing the road surface, creating a bed for germination of seed, whether native or non-native. If weeds are present while this work is preformed, the risk of weeds re-establishing and spreading is high.

Table 27. Road Management Activities and estimate acres of disturbance.

Road Activity	Proposed Action Acres¹³ (miles)
Road Construction	
Temporary roads	21.6 (4.4)
New construction	19.6 (4)
Road Reconstruction/Maintenance	68.6 (14)
Total	109.8 (22.4)

The roads that bisect or are adjacent to proposed activities within this project area are of particular concern. These roads are the primary sources of weed seed that could invade and establish within the proposed activity areas. The existing weeds along the roads could also be transported into uninfested areas on the machinery or vehicles that would be used to accomplish the proposed activities (Birdsall et al. 2012 Ward W., Runyon, Justin B. 2012 Roads impact the distribution of noxious weeds more than

¹³ 4.9 acres per mile was used to estimate the amount of disturbance associated with road management activities – 40ft average width of road multiplied by 5,280'/mile divided by 43,560 sq. ft. per acre

restoration treatments in a lodgepole pine forest in Montana, U.S.A. *Restoration Ecology* Vol 20, No 4, pp 517-523).

Cumulative Impacts

In consideration of past, present, and reasonably foreseeable future activities (Table 9), past soil disturbing activities over the last sixty years have helped spread noxious weeds into and throughout the analysis area. The weed populations would continue to be influenced by a variety of land-uses including recreation, forest management, private land development, road construction, use, and maintenance, and the results of weed management. This is true across all land ownerships.

It is not known when the first noxious weeds established in the project area. A good estimate would be in the late 1800's when sheep grazing introduced St. John's wort to the area. Although there are no records, it is assumed that road construction and timber harvest have contributed to the weed spread throughout analysis area as a result of timber harvest in the early half of the 1900s.

Before the early-1990s, there were few, if any noxious weed prevention measures in place. The Lolo National Forest adopted preventive measures to avoid weed spread and introduction of new invasive species with the 1991 Noxious Weed Management Amendment to the Lolo Forest Plan. This authorized integrated pest management strategies including the use of certain herbicides. Contractual provisions included washing of equipment to remove weed seeds and propagules prior to entry onto National Forest System land, contactor herbicide spraying of haul routes and use of weed-free seed grass to re-vegetate disturbed ground. These weed control measures have been included with timber harvest, road building and fire suppression activities to reduce the risk of invasive species. The ground disturbing harvest activities associated with the proposed action could potentially promote the establishment of new weed species and increase the spread of weeds. However, project design features and monitoring (Appendix B) would reduce the likelihood of weeds spreading and becoming a prominent vegetative component within the project area.

Since 1996, there has been over 56,000 acres of noxious weeds treated forest-wide. Within the same timeframe, the Superior Ranger District treated over 9,800 acres across the district. Some noxious weed management has occurred in the project area over the last 10 years. In 2007, the Lolo National Forest adopted an adaptive and integrated weed management strategy to include treatment of new weed species, new weed patches and use of new control methods with the Integrated Weed Management EIS. This EIS also allows weed treatment of up to 15,000 acres/year on the forest.

Past weed treatments along the drivable roads are reducing the weed populations, thereby reducing the potential of weed seed dispersal and weed establishment. Weeds on the un-drivable roads would continue to spread until the road prism is sufficiently shaded from the surrounding forest and from the vegetation growing in the road prism to slow the spread. Along with the past and ongoing weed treatments, project design features (Appendix B) would reduce the likelihood of weeds spreading and becoming a prominent vegetative component within the road corridors and would help minimize the risk of weed spread on haul roads during implementation.

Private and state land located in and along the edges of the project area would be a source for weed seed. Weed treatments on this private land may or may not occur depending on the landowner. This also could increase the amount of existing weeds and the possibly the number of species gradually over time in the project area.

In the future, this area would be a popular destination for hunters, wood cutters, huckleberry pickers, and other visitors. Summer and fall are the primary months of visitor activity. Recreationists would likely spread the existing weeds or introduce a new invasive species into the analysis area. The vehicle traffic on

the open road system within this analysis area could be a conduit for the introduction of a new species or the spread of the existing weeds.

Soils Resource

This section discloses the impacts of the proposed action on the soil resources based on the framework of the Lolo Forest Plan and the R1 Soil Quality Standards (SQS). Soil resource concerns are framed in the context of soil productivity (including measures of detrimental soil disturbance and organic matter) and soil stability (soil erosion potential and detrimental soil disturbance). Additional information about methodology, data sources, and other information supporting the conclusions summarized here can be found in the resource report in the project file.

To understand the effects of management activities on soil resources will be discussed based on the framework of the Lolo Forest Plan and the R1 Soil Quality Standards (SQS). The Forest Service, Northern Region (Region 1) Soil Quality Standards defines the degree and extent of disturbance allowed for management activities, while still maintaining soil productivity, thus meeting the intent of the National Forest Management Act (1976). As defined by the Region 1 Soil Quality Standards, at least 85 percent of an activity area must retain soil quality in an unimpaired condition. Forest Service Manual Section 2550 and the Region 1 Supplement 2500-2014-1 provide the regulatory guidance for maintaining productivity during management activities.

Physical variables influencing soil productivity include texture, structure, coarse fragments as well as organic matter and biological activity (Page-Dumroese et al. 2006 M. F., Tiarks, A. E., Ponder F. Jr., Sanchez, F.G., Fleming, R.L., Kranabetter, J.M. 2006. Soil Physical Property Changes at the North American Long-Term Soil Productivity Study Sites: 1 and 5 Years after Compaction. Canadian Journal of Forest Research 36, no. 3 (March 2006): 551–64). Soil functions, as they relate to soil productivity, can be difficult to assess without detailed laboratory analysis. Therefore, indicators of detrimental soil disturbance leading to impairment of soil productivity were collected in the summer of 2019 during field visits to the proposed mechanical treatment units using the protocols and methods outlined in the Region 1 Soil Disturbance Technical Guide. Table 28 describes the indicators used to estimate impacts on long-term soil productivity.

Table 28. Soils resource measures and indicators used to understand impacts of proposed management activities.

Visual Indicators of Detrimental Soil Disturbance	Measurement (FSM 2500-2014-1)
Soil compaction	Detrimental compaction is a reduction in pore space associated with decreased infiltration and increased erosion potential. Severity of compaction may be indicated by size and depth of massive or platy soil structure.
Rutting	Wheel ruts greater than 2 inches deep in wet soils.
Soil displacement	The absence or removal of 1 or more inches of any surface horizon and its duff layer, from a contiguous area greater than 100 square feet.
Surface erosion	The presence of rills, gullies, pedestals, and/or areas of soil deposition are all visible indicators of surface erosion.
Severely burned soils	High intensity burns of long duration which cause physical (altered structure and color) and biological (fertility and nutrient cycling) changes to soil are detrimental. Guidelines for assessing

Visual Indicators of Detrimental Soil Disturbance	Measurement (FSM 2500-2014-1)
Soil compaction	Detrimental compaction is a reduction in pore space associated with decreased infiltration and increased erosion potential. Severity of compaction may be indicated by size and depth of massive or platy soil structure.
	changes to soils after a fire are contained in the Field Guide For Mapping Post-Fire Soil Burn Severity (Parsons et al. 2010 P., Lewis, S., Napper, C., 2010. Field Guide for Mapping Post-fire Soil Burn Severity. General Technical Report, RMRS-GTR-243)
Soil mass movement	Any potential for soil mass movement to be exacerbated by management activities is considered detrimental.

In Region 1, the six above indicators were developed for quick assessment of soil conditions. As an example, soil compaction can have a negative effect on plant root development by decreasing soil porosity and water infiltration. When soil functions are negatively affected, long term soil productivity may be impaired.

Cruzane Mountain Soil Map Units

Soils on the Lolo National Forest were mapped as part of the Lolo Land Systems Inventory (Sasich and Lamotte-Hagen 1989 MT.), which includes soil profile descriptions, vegetation observations and interpretations of such characteristics as potential for natural regeneration, surface erosion potential, sediment delivery and mass failure potential. Table 29 displays Land Type map units and interpretations for units that would receive mechanical treatment. Units designated for treatment by hand are not included, as hand treatment does not cause additional soil disturbance. The dominant landforms in the Cruzane Mountain project area include mountain slopes, while stream bottoms and foot slopes occupy a much smaller proportion.

Table 29. Lolo National Forest map units and Interpretations for Cruzane Mountain Mechanical Treatment Units

Map Unit	Mechanical Treatment Units	Landform	Natural Regeneration	Surface Erosion Potential	Sediment Delivery Potential	Mass Failure Potential	% of Treatment Acres
10UB	60, 61, 62B, 67	Stream bottoms	Poor; high water table	High	High	Low	.4
15JB	1, 2, 21, 3, 41, 48, 49, 50, 52, 53, 54A, 56, 60, 61, 62A, 62B, 62C, 62D, 63, 64, 66, 67	Toeslopes and alluvial fans	Good	High	Low	Moderate	19
30MD	1, 2, 21, 22, 23, 24, 25, 27, 28, 29, 43, 44, 45, 46, 47, 48, 49, 50, 51, 61, 62C, 62D, 65, 66, 68	Moderate relief mountain slopes	Good	Moderate	Low	Low	38
30QC	27, 28, 30, 31, 32, 42, 57	Moderate relief mountain slopes	Good	Low	Low	Low	10
30QD	27, 29, 30, 31, 32, 41, 51, 52, 53, 54B, 56	Moderate relief mountain slopes	Good	Low	Low	Low	9
64QB	19, 20, 66	Steep mountain Slopes	Fair; grass competition	Low	Moderate	Low	6
64QC	4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 30, 42, 57, 70	Steep mountain Slopes	Good	Low-Moderate	Moderate	Low	18

Direct and Indirect Effects

Soil disturbance is an unavoidable consequence of forest management activities. Best management practices, standard soil operating procedures, design criteria are applied to reduce disturbance and limit negative effects to soil resources (see Appendix B – Applicable Forest Plan Standards for implementation, Project-specific Design Features, and Monitoring).

Commercial vegetation management

Soil Productivity – Detrimental Soil Disturbance

Primary effects to soil productivity from the proposed action is soil disturbance from the harvesting of and transporting of logs. Soil disturbance is considered detrimental where soil compaction, topsoil

displacement, rutting, and surface erosion occurs negatively impacting soil function. Region 1 Soil Quality Standards limit detrimental soil disturbance to an area of 15 percent or less for each activity unit.

Commercial harvest is proposed on 1,411 acres, resulting in an estimated 134 acres of total detrimental soil disturbance within proposed activity units (9% of total treated acres). Included in this acreage is 4.4 miles (8.5 acres) of temporary roads (4.4 miles = 23,255 feet x 16 feet of width/43,560 (square feet in an acre) equaling 8.5 acres). This disturbance is contained within the footprint of harvest operations. Soil productivity would be maintained since project related soil disturbance would dissipate with time and the overall DSD created during activities is well below the 15% Regional threshold that could signal long-term impairment of soil function.

The majority of the soil types in the Cruzane Mountain project area are resilient to soil disturbances associated with logging operations. Units that have soil sensitivity concerns as they contain soil map units 10UB and 15JB, were evaluated during field analysis and found not to have issues that would preclude the use of machinery with respect to the project design features included in Appendix B. Some minor areas with previous harvest have residual logging features that would be reused to minimize additional disturbance, and then reclaimed.

Exhaustive research has been conducted to determine the major factors causing detrimental disturbance in harvest activities. Research has shown disturbance can range from 1 to over 40 percent, with the key variables being type of equipment used, soil moisture, season of operation, and silvicultural prescription (Rone); (Reeves et al. 2011 Coleman, M. 2011. Detrimental Soil Disturbance Associated with Timber Harvest Systems on National Forests in the Northern Region)). Values used to estimate the potential amount of increased detrimental disturbance created by proposed activities was based on monitoring efforts and research associated with ground based skidding, skyline yarding, combination methods, and temporary road construction. Additionally, areas of existing disturbance (landings, temporary roads) from past management activities would be reused and rehabilitated following harvest operations. These assumptions are further described in the resource report in the project file.

Based on assessing the existing detrimental soil disturbance and the estimated disturbance from commercial vegetation management activities, none of the units are expected to exceed 15 percent through the use of best management practices, standard contract provisions, and applicable project design features. A unit-by-unit breakdown of resulting detrimental disturbance from this analysis can be found in the project file.

Soil Productivity – Organic matter, coarse woody debris, and biological activity

Harvest operations affect the availability of organic matter and overall nutrient cycling by removal of the stored nutrients in forest biomass, especially if the litter layer is impacted and woody debris are removed. Commercial harvesting removes a larger amount of the nutrients from the site compared to thinning operations which leave fine materials in place. The exact amount of nutrients lost from a particular site would vary with forest types and particular site conditions (Grier et al. 1989 K.M., Nadkarni. M.N. 1989. Productivity of Forests of the United States and Its Relation to Soil and Site Factors and Management Practices: A Review. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 1989). Any project effects would retain coarse woody debris to aid in nutrient replenishment of organic matter and humus stores would remain on the site (Busse et al. 2009 F. G., Ratcliff, A. W., Butnor, J. R. Carter, E. A., Powers, R. F. 2009. Soil carbon sequestration and changes in fungal and bacterial biomass following incorporation of forest residues. *Soil Biology & Biochemistry*, Vol. 41: 220-227).

Organic matter and coarse woody debris are good indicators of site resiliency and overall forest health. Organic matter, including the forest floor duff layers and large woody material, is essential for maintaining ecosystem function by moderating soil temperatures, improving water availability, and adding to microbial biodiversity (Page-Dumroese et al. 2010).

Part of the purpose and need of the Cruzane Mountain Project is to restore vegetation conditions that are resilient to natural disturbances by reducing forest fuels. This objective includes reducing the amount of downed timber from the forest floor where it exceeds standard amounts described in the Lolo National Forest Woody Material Guidelines while continuing to provide organic matter inputs for continuing soil productivity. All surveyed units met or greatly exceeded the guidelines. Coarse woody material was represented within project units in several size classes, from wood less than 3 inches in diameter to wood greater than twelve inches in diameter. Project activities would reduce fuel loading where necessary, but coarse woody debris levels would remain within the acceptable ranges.

In the proposed treatment units, areas with detrimental levels of soil compaction, displacement, and other physical disturbances caused by harvest activity could reduce the capacity for nutrient cycling, thus affecting the ability of soil organisms and fungi to survive. With the use of best management practices, negative effects to soil productivity would be reduced. Soil micro-organisms from outside the harvest footprint would soon recolonize disturbed areas, as no long term change in organic matter is expected from proposed project activities. Powers (2002) concludes soil productivity is preserved if the loss of biomass, organic matter, soil porosity and topsoil is limited. Outside of landings and skid trails, large areas (greater than 100 square feet) with detrimental levels of soil disturbance are not expected with the use of Best Management Practices and Timber Sale Contract provisions. Mitigations, including harvest season and retention of coarse woody debris as specified by the Lolo NF Guide to Downed Woody Material (2006), would protect soil biological processes.

Soil Stability

Soil stability is tied closely to measurable indicators of soil erosion and sediment delivery potential. Surface erosion potential is low to moderate for the majority of soils in the project area, except in mapped stream bottoms (map unit 10UB) and toe slopes (map unit 15JB), constituting approximately 20% of mechanical treatment areas. Field review of the majority of treatments units containing these land types found no soil concerns for standard ground-based logging operations. For all other soils in the project area, high vegetative cover and rock content in the soil profile results in increased infiltration and decreased runoff, thus reducing the surface erosion potential. Soils in the project area are stable in their undisturbed state.

Although none of the soil map units in the Cruzane Mountain Project area raised concern for mass failure under normal operating procedures, hydrological modeling indicated an elevated risk of mass failure in treatment units 18 and 19 due to steepness and possible wetness. Therefore, these units would receive additional field evaluation to determine feasibility of harvest operations (Appendix B).

Roads

System roads are part of the forest travel management plan, therefore, Region 1 soil quality standards do not apply as their footprint is removed from the productive soil base (R-1 Supplement 2500-14-1, 2014). However, temporary roads constructed to access treatment units are considered part of the productive soil base and are therefore considered 100% detrimentally disturbed.

Road length expressed as acres of new temporary road in the effects analysis for detrimental soil disturbance. Approximately 4.4 miles of miles of temporary road construction is proposed for this project.

Temporary roads may also result in concerns for soil stability where underlying mass failure and erosion hazards exist. Proposed temporary road segments were reviewed in the field as well as spatially, and no mass failure concerns were documented for the stable geologic types predominant in the project area. Standard operations to meet best management practices would be included in layout and management of these temporary roads during their use to prevent erosion.

Temporary roads would be rehabilitated immediately following completion of proposed project activities. Re-contouring activities would not immediately erase impacts to soil productivity, however, normal soil functions would recover more quickly compared to an abandoned road with no restoration as re-contouring and scarification provides a suitable seed bed for native forest vegetation while increasing soil permeability leading to faster recovery of organic matter, total carbon, and total nitrogen (Lloyd et al. 2013 K. A., Ferré, TPA. 2013. Influence of Road Reclamation Techniques on Forest Ecosystem Recovery. *Frontiers in Ecology and the Environment* 11, no. 2 (March 2013): 75–81)). For the long-term, infiltration rates improve as freeze/thaw cycles and plant roots increase soil porosity as normal biological function returns to the temporary road base.

Prescribed fire and Non-commercial thinning treatments

Non-commercial treatments are a low risk to soil resources. Hand thinning is assumed to cause no additional soil disturbance, and the Lolo Soil Monitoring Reports confirm there is negligible impact associated with non-commercial hand thinning (Lolo Soil Monitoring Reports 2006-2018, project file).

The low and moderate severity fire treatments prescribed for this project are a resource benefit for soils. The forest types within the Cruzane Mountain project area are fire-adapted and controlled fires are an ideal method that is compatible with normal ecosystem functions to remove excess fuels, expedite nutrient cycling, and invigorate seed sources in forest floor materials (Ball et al. 2010 M.D., DeLuca T.H., Holben W.E. 2010. Wildfire and Charcoal Enhance Nitrification and Ammonium-Oxidizing Bacterial Abundance in Dry Montane Forest Soils. *Journal of Environment Quality* 39, no. 4: 1243); (DeLuca and Sala 2006 A. 2006. Frequent Fire Alters Nitrogen Transformations in Ponderosa Pine Stands of the Inland Northwest. *Ecology* 87, no. 10, 2511–22).

To mitigate risk of soil erosion associated with exposed forest soils following burning, small diameter slash can be used to cover forest floor openings greater than 100 square feet where high soil burn severity may result in vulnerable soil conditions. With the implementation of Standard Operating Procedures for prescribed burning, the impacts associated with non-commercial activities would meet the intent of National Forest Management Act (1976), the Lolo Forest Plan, and Region 1 Soil Quality Standards.

Cumulative Impacts

Cumulative impacts include the combined effects of forest management activities which overlap in both time and space with those of the proposed actions. For the soil resource, the areas of concern are the treatment units since impacts to soils are site specific. Past activities are considered as a component in the current condition of the soil resource and related disturbance is captured during field review.

In summary, cumulative effects to soils would be minimal and site specific. No additional effects to soils within project activity units are expected to occur beyond those analyzed and disclosed in this analysis.

Hydrology

Hydrology analyses were completed to understand the effects to the hydrological resources from the proposed treatments. No issues with water quality or quantity were identified for the project, because no

municipal watersheds are listed, design features would protect water resources, and the project is not expected to have substantial effect on water quality or quantity.

Direct and Indirect Effects

Wetlands

The National Wetlands Index (NWI) GIS layer shows a total of 2.20 acres of freshwater emergent and freshwater forested/shrub wetlands within Units FB1 and FB2. Project treatments in these units are fuel break construction. Project design features including hand thinning only and implementation of national core best management practices (BMP) will reduce impacts to the wetlands.

Erosion

Erosion modeling was completed using the Forest Service Water Erosion Prediction Project (FSWEPP) program ((Elliot et al. 2000) at <https://forest.moscowfsl.wsu.edu/fswepp/>) and with site specific data (climate, slope, soil surface texture, length to drainage, cover percentage, and rock content) to determine upland erosion and sedimentation into stream channels. Upland erosion and sedimentation into stream channels rates are estimated to last up to three years following prescribed burning and five years following wildfire scenarios.

Several proposed treatments scenarios were modeled using FSWEPP web interface. Three weather scenarios are used to determine upland erosion and sediment reaching the stream channel: an average year winter (27.64 inches of precipitation), 15-year winter (37.69 inches of precipitation) in a heavy rain fall winter, and a 30-year winter (42.62 inches of precipitation) in an El Nino type winter.

Modeling results show that there is a slight potential for upland erosion of 0.02 tons per acre and sediment reaching stream channels of 0.01 tons per acre in Unit 18 only in the 15 year and 30-year winter scenarios.

Slope analysis determined that Unit 18 had an average slope of 60 percent and a maximum slope of 76 percent and will be regeneration harvested using a skyline logging system. The results of the wetness model methodology show that Unit 18 is mapped as seasonally wet. The proximity of Unit 18 to the St. Regis River and Interstate 90 (about 0.25 mile) indicates that Unit 18 and a portion of Unit 19 will need to be dropped from the project to minimize the low to moderate risk of a mass wasting event during a 30-year winter scenario.

Because the Land Systems Inventory did not indicate risk for instability in this area, the interdisciplinary team included a project specific design feature was developed to require a forest hydrologist or soil scientist to visit these units to evaluate stability and complete any necessary wetland delineation needs. Any wetland areas would be buffered as necessary per INFISH requirements for Category 3 or 4 wetlands to ensure compliance and also to ensure there is no risk of mass wasting due to continual wetness in areas of steeper slopes. Feasibility to harvest these units will be reconsidered after completion of these field reviews and coordination with Silviculture/Timber Management or Sale Administrator and the District Ranger (Appendix B). See project file for further details on the erosion modeling completed for this project.

Roads

Proposed changes to the transportation system in the project area include designating several unauthorized routes as NFS system routes, decommissioning NFS system roads, and creating several temporary routes for project treatments. Decommissioning activities include treatments to remove the

potential for sediment to reach stream channels. Sediment analysis using the Rocky Mountain Research Station (RMRS) GRAIP Lite GIS model was completed on the existing road network, project implementation phase adding temporary routes, and post implementation phase decommissioning routes and temporary roads. Table 30 shows the summary of total sediment reaching the St. Regis River at the base of the project area.

Table 30. Sediment Delivery Summary in tons per year.

Stream Reach	Existing Sediment	Implementation Sediment	Post Project Sediment
St Regis River at base of Project Area	133.6	164.6	96.9

Implementation of the project would increase the sediment reaching the St. Regis River up to 31 tons per year (about 23 percent increase) over existing conditions. There would be a total reduction in sediment of 36.7 tons per year (about 28 percent reduction) compared to the existing condition reaching St Regis River after the post-project decommissioning is completed.

Clean Water Act

The St. Regis River is listed on the Final 2018 Water Quality Integrated Report (project file) as an impaired waterbody for sedimentation and stream temperature with a total maximum daily load required (TMDL). A TMDL for the St. Regis Watershed was finalized in 2008 (Montana Department of Environmental Quality) addressing the sedimentation concerns for the watershed. Roads are generally the number one source of sedimentation in a forested watershed. The Lolo NF completed a review of all FS routes as part of project analysis. The roads proposed for decommissioning will reduce the sediment reaching the St. Regis River at the base of the project area by 36.67 tons per year compared to existing conditions.

Cumulative Watershed Effects (CWE)

An Equivalent Clear-cut Area (ECA) analysis was completed for the project for the Cumulative Watershed Effects. The ECA methodology assigns a coefficient for all timber harvests, roads, and fire history in the project watersheds. A value of 1 represents a road. The timeframe for full recovery in the ECA methodology is 80 years. Each past harvest was calculated using the assigned coefficient and the time recovery associated to the year 2020. An example is a commercial thin harvested in the year 1980. Coefficient for a commercial thin is 0.25 and is reduced by the time of recovery (40 of 80 years) and the ECA for the year 2020 would be 0.125 multiplied the number of acres in that unit.

Table 31 displays the summary of the existing ECA and proposed ECA as a percentage of NFS lands in the watershed. The proposed ECA percentage was calculated using the worst-case scenario that all harvesting occurs in the first year of implementation and will show the maximum percent ECA.

Table 31. Cumulative Watershed Effects Summary

HUC14 Watershed	Total Watershed Acres	NFS Acres	Existing ECA Percentage Year 2020	Proposed ECA Percentage Year 2022
Big Creek	19,441	16,419	6.5	9.8
Packer Creek	11,654	10,361	3.5	6.8

The threshold of concern for the ECA methodology is 25 percent. Values over 25 percent would require additional field work, analysis, and design criteria to minimize ECA. The results of the modeling indicate both HUC12 watershed in the project area will be substantially below the threshold of concern. Project design features (Appendix B) and national core best management practices will further reduce compaction from proposed activities.

Conclusion

A hydrological analysis was completed for the Cruzane Mountain project which included erosion modeling, wetland assessment, roads assessment, cumulative watershed effects modeling, and Clean Water Act review. The conclusions drawn from this analysis show no potential for a substantial effect to hydrological resources with implementation of the proposed treatments over the course of the project timelines. This project is consistent with the forest plan, Clean Water Act, and Executive Order 11990.

Aquatic Wildlife Species

This analysis will focus on bull and westslope cutthroat trout because management and conservation efforts for these species are the focus of Forest Service and other regulatory and fish management agencies. Impacts to other fish species would be similar to those as described for bull trout and westslope cutthroat trout given similar habitat preferences.

The Cruzane Mountain project is located within portions of two watersheds (HUC12 – 6th level), Packer Creek and Upper Saint Regis River. The southern boundary of the project area borders the St. Regis River. Two substantial streams (and their tributaries) which flow into the St. Regis River, Packer Creek (western boundary of project area) and McManus Creek (eastern boundary of the project area), encompass most of the project's drainage area. Additionally, a small portion of the Timber Creek drainage is present within the easternmost extent of the project area.

The following table displays the species considered for analysis, as well as a summary of effects and determination statements. Special status species located within the Lolo National Forest, and potentially within or near the project area, were obtained from the Region 1 special status species website (<https://www.fs.usda.gov/detail/r1/plants-animals/?cid=stelprdb5130525>). The lists for federally listed aquatic species (2010) and U.S. Forest Service sensitive species Regional Forester's list (2011). In addition, a reference IpaC list was downloaded from the U.S. Fish and Wildlife Service website (<https://ecos.fws.gov/ipac/location/index>) on January 2nd, 2020; bull trout were the only federally listed aquatic species present on the list.

Table 32. Aquatic species summary and determinations.

Species	Status*	Determination**	Rationale
Bull Trout (<i>Salvelinus confluentus</i>)	Federally Threatened Federally designated Critical Habitat	<i>May affect, Not likely to adversely affect</i> <i>No Effect</i>	Bull trout are presumed absent from the project area, with the nearest potential recent population located more than 10 miles downstream (Ward Creek vicinity) of the project area. Suitable habitat may be present in portions of some project streams (e.g., Packer and McManus Creeks), while other streams are likely unsuitable (e.g., St. Regis River) due to high temperature and fine sediment loading. Because some streams may contain suitable habitat, species absence cannot be absolutely assumed into the foreseeable future. No bull trout designated critical habitat is located within or near (9 miles) the

Species	Status*	Determination**	Rationale
			<p>project area. See westslope cutthroat trout for potential minor habitat effects that area also relevant for bull trout potentially suitable habitat.</p> <p>Short-term effects to habitat indicators (e.g., sediment) are possible in currently unoccupied habitat, with no measurable effects expected to reach critical habitat or occupied streams (vicinity of Ward and Twelvemile Creek). Models indicate a long-term reduction in sediment input due to improvements to road network, and no measurable temperature effects are expected.</p>
Westslope Cutthroat Trout (<i>Oncorhynchus clarki lewisi</i>)	Regionally sensitive	<i>May impact individuals or habitat but will not likely result in a trend toward federal listing or reduced viability for the population or species.</i>	<p>Westslope cutthroat trout are present within many project streams, including Packer and McManus Creeks and their tributaries; some of these populations are thought to be genetically unaltered, while others are likely cutthroat-rainbow trout hybrids.</p> <p>Short-term effects to habitat indicators (e.g., sediment) are expected in currently occupied habitat, particularly immediately adjacent to, and downstream of, road work. The magnitude of these effects is unlikely to measurably effect cutthroat trout populations due to implementation of habitat protecting project design features and Best Management Practices.</p> <p>Modeling indicates a long-term reduction in sediment input due to road decommissioning and improvements to drainage characteristics of the road network. Other potential effects, such as water temperature change, are not expected to be measurable at analysis scales (small watershed) due to the lack of project treatment within occupied waters, and restrictions/requirements on activities within riparian areas that are expected to adequately protect all habitat indicators.</p>
Western Pearlshell Mussel (<i>Margaritifera falcata</i>)	Regionally sensitive	<i>No Effect</i>	This species is not known to occur within the St. Regis River watershed; therefore, it is assumed absent and would not be affected.

No detailed analysis was completed for western pearlshell mussel (*Margaritifera falcata*) due to no known occurrences within proximity of the project area and that it would not be affected by the proposed action. The Cruzane Mountain project area contains naturally reproducing native fish species including, westslope cutthroat trout (*Oncorhynchus clarki lewisi*), mountain whitefish (*Prosopium williamsoni*), and sculpin (*Cottus spp.*). Nonnative fish are prevalent throughout the area and include, rainbow trout (*O.*

mykiss), brook trout (*Salvelinus fontinalis*), and brown trout (*Salmo trutta*). In addition, it is believed that cutthroat/rainbow trout hybrids are common within analysis area streams.

Additional information about methodology, data sources, and other information supporting the conclusions summarized here can be found in the resource report in the project file.

Direct, Indirect and Cumulative effects

In order to determine if the proposed action would have a substantial effect on aquatic resources it is first necessary to define a threshold by which the duration and intensity of effects are evaluated. The effects threshold for this report is based on Lolo National Forest Plan standards 24, 27, and 28 ((U.S. Department of Agriculture 1986 MT.)), defined as:

“Any effects from Cruzane Mountain actions that impedes listed species recovery, threatens the viability of aquatic species, or imposes a downward trend on the aquatic ecosystem indicators (i.e. pool frequency, water temperature, large woody debris, width/depth ratio, sediment, physical barriers).”

Proposed actions of primary aquatic concern are project activities that could affect the stream habitat indicators of sediment or temperature. These two indicators are particularly important to native cold-water species, such as westslope cutthroat trout and bull trout. Effects to other indicators, such as large wood debris and channel width-to-depth ratio, are expected to be minimal or absent since the large majority of project activity would not occur within designated Riparian Habitat Conservation Areas (RHCAs). The small amount of treatment proposed within RHCAs represents only a small fraction (about .5%) of total analysis area RHCAs. Per project design features (Appendix B), prior to implementation all RHCA portions of applicable units would be field verified by an interdisciplinary team, including a fisheries biologist. Site-specific treatment would be designed to ensure compliance with INFISH, including maintenance or improvement of all Riparian Management Objectives (e.g., large woody debris, sediment input, stream temperature). The few road treatments at or near stream crossings are mostly located upstream of fish distribution, limiting any chance for disruption of fish passage.

Site visits over the past few years identified especially sensitive aquatic areas, such as: seeps, springs, and perennial stream crossings. To mitigate potential effects to specific problem areas, and stream habitat in general, Resource Protection Measures (RPMs) were designed to reduce effects from all 4 project activity categories: commercial vegetation management, non-commercial vegetation management, road management, and ecosystem management burns. In addition to project-specific protective measures (project design features), all national Best Management Practices (BMPs) would be implemented.

Most ground-disturbing project activities are expected to occur during the dry season, which should reduce effects such as sediment mobilization. Management burns usually have a longer season, but usually pose less risk. This should reduce biological effects to aquatic species if sediment does reach a stream since spawning usually occurs in the spring for westslope cutthroat trout and fall for bull trout (likely absent from project analysis area).

Federally Listed Species

Bull trout were listed as a threatened species in 1999 and in September 2010 the U.S. Fish and Wildlife Service updated and designated critical habitat for bull trout throughout their U.S. range. Historic distribution (from Bull Trout Conservation Strategy):

Historically, bull trout likely occupied nearly all of the third order and larger tributaries in the St. Regis River basin, and probably extended up the mainstem to within a mile or two of St. Regis

Lakes. Many of these tributaries, such as Big Creek, Timber Creek, and Twelvemile Creek supported bull trout populations as recently as the late 1980's. Others, such as Deer Creek, Silver Creek, Randolph Creek, Twomile Creek, and Savanac Creek probably supported bull trout until the 1960's or 1970's when widespread timber harvest and development of the transportation system caused the overall population to decline and become restricted in range. Currently, the only streams where bull trout are commonly observed are Little Joe Creek and Ward Creek (numbers in Ward Creek are too low to count accurately).

Bull trout (*Salvelinus confluentus*) are not known to occur in any streams in the project vicinity, though they were present historically in the upper St. Regis River and some of its tributaries. Currently (2019), the nearest potentially occupied habitat (USDA, RMRS 2019) is located more than 10 miles downstream of the project area, in the vicinity of Ward Creek (tributary to St. Regis River). No critical habitat is located within or near the Cruzane Mountain Project; the nearest critical habitat is located within Twelvemile Creek and portions of the St. Regis River, about 9 miles downstream of the project area. The project area is located within the Middle Clark Fork core area, and St. Regis River local population unit. The importance to local bull trout populations for the two project watersheds (Packer Creek and Upper St. Regis River) is rated as “moderate” for significance to local population, and “high” for contribution of habitat in limiting population.

Findings of the biological assessment indicate minimal or no sediment effects from project vegetation units, and a measurable short-term increase in sediment from project road work activities, following by a sediment decrease in the longer term as compared to existing condition. No measurable effects to temperature or other habitat indicators are expected at the sub-watershed (HUC 12) scale. While it is unlikely, there is insufficient data to completely preclude the possibility bull trout may occasionally occupy the St. Regis River in the project area vicinity; this report assumed the nearest likely occupied habitat is located more than 9 miles downstream, in Ward Creek or Twelvemile Creek (designated critical habitat). If bull trout were to migrate to project vicinity, they could conceivably be subject to effects related to elevated turbidity, such as behavioral changes (Muck 2010).

This slight potential for overlap between project effects and bull trout leads to an Endangered Species Act determination of may affect, not likely to adversely affect for bull trout.

The determination for bull trout critical habitat is no effect as no project effects are anticipated to reach designated habitat at the confluence of Twelvemile Creek. A biological assessment has been prepared to disclose potential bull trout effects to the Fish and Wildlife Service according to Section 7 consultation requirements.

Regionally-sensitive Species

The Lolo National Forest Plan (USDA Forest Service 1986) requires the National Forest to manage for sensitive species such that they do not become listed under the Endangered Species Act (ESA). Westslope cutthroat trout (see analysis figures for distribution) are a designated Forest Service, Region 1, sensitive species that indicates viability of the species is a concern; this species is well-distributed throughout project-area streams, including some populations that may be genetically unaltered (not hybridized). The Western Pearlshell Mussel (*Margaritifera falcata*) is also a sensitive species, but surveys have not documented their presence within the St. Regis River drainage. No other Region 1 sensitive aquatic species are known to occur near the project area.

Direct effects of proposed actions to aquatic species (e.g., westslope cutthroat trout) are limited to the instream work during the temporary bridge/culvert work on McManus Creek. These effects would be

isolated to this construction site at low flows such that the number of individuals that could potentially be affected would be so low that overall population viability is not a concern.

Indirect effects to aquatic species are related to occasionally increased turbidity and substrate embeddedness. The duration and intensity of effects are low enough that nearly all effects to aquatic species would likely be sub-lethal.

Cumulative effects to aquatic species are likewise primarily related to sediment delivery and are expected to be low enough that overall effects would not threaten species viability. This finding is based on population viability principles outlined in *Consideration of Extinction Risks for Salmonids* (Rieman et al. 1993), where four population characteristics and two regional population characteristics were assessed for westslope cutthroat trout and bull trout. Risk levels for each population characteristic were assigned using professional judgement by Lolo fisheries biologists as suggested by Rieman et al. (1993) (Table 33).

A low risk of extinction means that a population has a high probability (>95%) of persisting through the period relevant to forest management (100 to 200 years) given existing or improving conditions, while populations with high risk of extinction have less than 50% probability of persisting through the same time period (Rieman et al. 1993 J. McIntyre, K. Overton, and R. Thurow. 1993. Consideration of extinction risks for salmonids. USDA Forest Service, Intermountain Research Station, Work Unit 4203, Boise, Idaho.).

Based on the preceding analysis, the determination for **westslope cutthroat trout** is: *may impact individuals, but is not likely to result in a trend toward federal listing or reduced viability for the species or population* within the Planning Area. Due to species absence from the project area, the determination for all other Forest Service sensitive aquatic species (e.g., western pearlshell mussel) is No Effect.

It is important to note that the extinction risk assessments in the table below are based on existing conditions based on cumulative effects, to include Clark Fork dams, non-native species introductions, federal and non-federal land use practices, and climate change. Based on this effects analyses, proposed actions would not be expected to increase the risk of extinction for either westslope cutthroat trout or bull trout.

Table 33. Westslope cutthroat trout and bull trout population risk assessments. Local Population refers to the project watersheds and Regional Population is the Middle Clark Fork core area. Descriptions of Population Characteristics and Risk Level criteria can be found in (Rieman 1993)

Population Scale	Population Characteristics	Risk Level	
		Westslope Cutthroat Trout	Bull Trout
Local	Temporal Variability in Recruitment/Survival	Low	High
	Population Size	Low	High
	Growth, Survival	Low	High
	Isolation	Low	High
Regional	Replication	Low	Moderate
	Synchrony	Low	Moderate

Effects to Aquatic Ecosystem Indicators

The direct, indirect, and cumulative effects to Pool Frequency, Water Temperature, Large Woody Debris, and Width/Depth Ratio, and Physical Barriers would likely be negligible because the vast majority of proposed treatment is not located within RHCAs. Project design features and BMPs would be applied to those that are, including site visits by a fisheries biologist to ensure consistency with INFISH requirements (Appendix B).

Of all the indicators, the greatest risk of causing a downward trend is to Sediment. Modeling indicates little to no sediment capable of reaching aquatic habitat would occur from vegetation treatment units. Modeling for road work related sediment indicates a measurable increase in the short-term from the combined road activities (e.g., construction, maintenance). This increased sedimentation would occur during and shortly after (within a few years) implementation; however, an approximate 27% decrease in longer term sedimentation is expected due to project road improvements (e.g., road decommissioning, improved drainage), supporting a positive trend for the Sediment indicator. Instream project road work is proposed at one fish-bearing stream, the crossing of McManus Creek by Forest Road 3831. Short-term disturbance would occur at this site, though the crossing is expected to be improved (easier passage from culvert replacement, bank stabilization), supporting maintenance or improvement of the Physical Barriers indicator. Supporting information can be found in the Hydrology section and in the project file.

Transportation

A travel analysis was prepared for the Cruzane Mountain Project (the project) to assess the benefits and risks of the transportation system for the project. This analysis involves a quantitative rating process to examine the existing road system to determine if roads are needed for current and future management needs. Resources rated each road to understand the risks and benefits associated with that road. Benefitting resources generally include: recreation, fire prevention and management, and forest management such as timber harvest. Resources that may be negatively impacted by roads were considered to be at Risk. Resources at risk generally include aquatics, wildlife, visuals, heritage, and roadless character. It also examined roads outside of the project area needed to transport commodities from the project to the nearest mill (FSM 7700, Ch. 7712.1 to 7712.3). Previous analyses considered to inform this project-level transportation analysis process included the 1986 Lolo Forest Plan and the Debaugen Record of Decision that was completed in 2009.

In 2015, the Lolo National Forest conducted a Forest-wide travel analysis in compliance with the January 12, 2001 Road Management Rule. The Travel Analysis Report for the Lolo National Forest (TAR) describes the science based travel analysis process (TAP) conducted by the Forest, and its findings. Approximately 6,080 miles of National Forest System (NFS) road across the Forest were determined to be “likely needed” for forest management access, 113 miles of NFS road were determined to be “likely not needed for future use”. No NFS roads within the Cruzane Mountain project area were identified as “likely not needed for future use”. The TAR explains that further site-specific project travel analyses would be used to determine the need for additional roads and identify other roads not needed. The forest-scale Travel Analysis Report helped to inform the Cruzane Mountain project-level transportation analysis. The transportation analysis project completed prior to and during the interdisciplinary team process of determining the proposed action examined roads needed, and not needed, for the project and future administrative access needs within the project area.

The specific effects of the road management activities are disclosed as necessary within other resource effects sections of this analysis. See the project file for benefit/risks analysis matrix conducted to support this project-level transportation analysis process.

Transportation Analysis Project - Existing transportation system

Outside of the project area boundary, the haul route to the nearest mill (Idaho Forest Group in St. Regis, Montana) includes approximately 1.6 miles National Forest System Road 288 (Forest Service maintenance – aggregate surface), 0.6 mile of NFSR 288 (County maintenance – aggregate surface), 1.3 miles of NFSR 288 (County maintenance – paved surface), 16.4 miles of Interstate 90 (Federal maintenance), and 1.6 miles of MT 135 (State maintenance – paved). Haul from the project area is routed east on National Forest System Road 288, toward Haugan, because of a transportation network impediment at Saltese (rating of County bridge is under gross vehicle weight of a loaded log truck).

When comparing the cost to maintain arterial, collector, and local roads, annual maintenance costs for National Forest System Roads 288, 3835, and 3845 are the highest because they are open to motorized vehicle travel and are maintained for passenger cars or high clearance vehicles. Other roads in the project area are closed to vehicle travel or are closed by vegetation and in custodial care. The Montana Nightriders Snowmobile Club maintains NFS road 288 for winter snowmobile use (signing, grooming).

The project area contains approximately 14.8 miles of National Forest System Road (NFSR), 9.3 miles of undetermined roads (UND), and 12.3 miles of County, private or other jurisdiction roads (Lolo National Forest Road Atlas (INFRA Database)) (Table 34). Field surveys were completed in 2018 to confirm road location and condition. Please note that the mileages associated with this portion of the environmental effects originates from the corporate database (INFRA) for managing road information versus ArcGIS (both included in the table below). Spatial analysis provided from other resources may differ from the INFRA mileages due to analysis processes within ArcGIS.

Table 34. Road System and Jurisdiction

System	Jurisdiction	INFRA Database Miles	GIS Miles
National Forest System Road	Forest Service	14.8	14.4
Undetermined	Forest Service	9.3	9.4
Interstate/State Highway	State of Montana	6.0	6.0
Private	Private	3.3	3.4
County	County	3.0	0.9
Total		36.4	34.0

Road construction and maintenance can have a greater impact on forest resources than any other management activity. Forest roads can precipitate substantial changes to landscape structure and composition ((Forman 2003 Clevenger AP, Cutshall CD, Dale VH, Fahrig L, France R, Goldman CR, Heanue K, Jones JA, Swanson FJ, Turrentine T, Winter TC (Eds) (2003) ‘Road Ecology: Science and Solutions.’ (Island Press: Washington DC)); (McGarigal et al. 2001 Roworth E (2001) Cumulative effects of roads and logging on landscape structure in the San Juan Mountains, Colorado (USA). Landscape Ecology 16(4), 327-349. doi: 10.1023/A:11185409347); Hawbaker and Radeloff 2004; (Hawbaker et al. 2006) and symbolize a legacy of human disturbance ((Forman and Alexander 1998)). In mountain landscapes, terrain is a key factor influencing road networks. Road configurations, combined with local environmental conditions, result in different effects on watersheds, wildlife, vegetation, recreation and disturbance processes ((Forman 2003 Clevenger AP, Cutshall CD, Dale VH, Fahrig L, France R, Goldman CR, Heanue K, Jones JA, Swanson FJ, Turrentine T, Winter TC (Eds) (2003) ‘Road Ecology: Science and Solutions.’ (Island Press: Washington DC))).

Three primary issues are associated with the positive (benefit) and negative (risk) effects of forest roads and their use including:

- Access – availability of public motorized vehicle access for recreation and other forest uses;
- Economics – costs (budget availability) to maintain roads; and
- Environmental impact – adverse effects of roads on various resources, including weed establishment and spread, wildlife habitat, water quality and fish, visuals, non-motorized recreation, and roadless resources.

Road Condition

Arterial and collector roads within the project area (NFSRs 288, 3835, and 3845) are in good condition; they are suitable for the vehicle travel described by the road's assigned operational maintenance levels. NFSR 3831 (collector) is vegetated with brush and trees and not passable to vehicles. Except for NFSR 3831, the arterial and collector roads in the project area receive annual upkeep including brushing, blading, and drainage structure maintenance; and are open to motor vehicle travel yearlong. When free of snow, they function along with other roads and trails on the Superior Ranger District, as a motorized trail for wheeled vehicles. In winter, NFSR 288 is part of an established snowmobile trail; closed to wheeled vehicles.

Table 35. Functional Class and Operational Maintenance Level

Functional Class	Operational Maintenance Level	INFRA Database Miles	Percent
Arterial	Maintenance Level 3	3.6	24.2
Collector	Maintenance Level 3	0.3	1.9
	Maintenance Level 2	.9	5.9
	Maintenance Level 1	3.5	23.4
Local	Maintenance Level 2	1.1	7.3
	Maintenance Level 1	5.5	37.4
Total		14.8	

Except for the first 0.2 miles of NFS road 18687, local roads (Forest Service jurisdiction) in the project area are mostly vegetated with brush and trees, and are not passable by motorized vehicles; in many areas even passage on foot is difficult because the vegetation density. These roads receive periodic inspection and custodial care.

Based on the transportation analysis, deferred maintenance needs on NFSRs 288, 3835 and 3845 are generally limited to: surface blading, roadside brushing, weed spraying, and minor drainage structure maintenance. The replacement of culvert crossings on NFSR 288 and West Fork Timber Creek, McManus Creek, East Fork of Packer Creek, and an unnamed tributary to the East Fork of Packer Creek was recommended. Culvert cross-sections at these locations are smaller than bank-full width, and therefore, partially inhibit fish movement and are at-risk to debris flows and failure during high water events. The length of these culverts is also too-short relative to the road width, increasing the potential for direct sediment delivery from the road surface to local waterways. Until replacement, sediment delivery may be mitigated at these locations by road surface narrowing, inlet/outlet armoring, localized aggregate

surfacing, and installation of surface drainage structures (drain dips and/or ditch sediment retention impoundments) and roadside delineators to prevent side-cast of material during maintenance.

Additionally, the transportation analysis identified deferred road maintenance needs on NFSR 3831 (collector), and other vegetated roads in the project area include: clearing and grubbing of trees and brush, road surface blading, repair or replacement of minor culverts, installation of surface drains (drain dips or water bars), weed spraying, and seeding to return these roads to their original design standard. On NFSR 3831, there were also needs to lower the horizontal alignment of the road entrance to match the elevation of adjoining NFSR 288, and to replace the major culvert (undersized) on McManus Creek.

Past road management in the project area has been limited to periodic inspections and reoccurring maintenance including road surface blading, roadside brushing, herbicide application for weed control, and drainage structure maintenance (cleaning and armoring). NFSR 288 is maintained annually in the winter for snowmobiles (snow grooming).

Road Density and Location

Total NFS road density on NFS lands in the project area is approximately 2.5 miles/square mile. Management Areas within the project area are expected to have road densities ranging from 2.8 to 6.7 miles per square mile. Approximately 2.4 miles of road are located within 300 feet of streams where the potential for impacts on water quality is highest.

Motorized Access

Per the current Motor Vehicle Use designations, public motorized vehicle access is available on 4.3 miles (30 percent) of NFS road in the project area (Table 36). Open road densities are approximately 0.71 miles/square mile. No change in public motorized access into the project area at this time. Existing road closure devices (gates, barriers) would be maintained or constructed with road management activities.

Table 36. Access and Travel Management

Travel Code	Vehicle Type Restricted			INFRA Database Miles	Percent
	Road Vehicle	Motorcycle and ATV	Snowmobile		
A	Yearlong	Yearlong	Yearlong	10.0	70
H	Oct. 15 – Dec. 1	Oct. 15 – Dec. 1	Oct. 15 – Dec. 1	0.3	2
K	Variable	Variable	Variable	4.0	28

Vehicle use in the project area is primarily non-commercial; driving for pleasure, fishing and hunting, firewood gathering, berry picking, camping, winter sports, traveling to a local destination, and other minor uses. To avoid Interstate 90, local residents use NFSR 288 as a primary thru-route between the communities of Saltese, Packer Meadows, and Deborgia. There are no unique access points (vista overlooks, special use areas, campgrounds, etc.) within the project area that are directly served by the transportation system (see Scenery Resources section). Intermittent commercial log truck traffic occurs on NFSRs 288, 3835, and 3845 from private land and National Forest System lands in the East Fork Packer Creek, McManus Creek, and Timber Creek drainages, north of the project area.

Direct and Indirect Effects

Adverse effects of NFS roads on resources in the project area are primarily associated with water quality due the near-proximity of NFSR 288 to the West Fork of Packer Creek, McManus Creek, East Fork and main stem of Packer Creek, and stream crossings (see Benefit/Risk ratings in project file).

Low traffic volumes, low traffic speed on open arterial and collector roads, and the vegetated condition of local roads, minimizes the effects of the transportation system on wildlife. Low NFS road density in the project area does not cause or contribute to an impediment to wildlife movement. The project is not in a linkage zone; however, nearby Interstate 90 is recognized as a significant barrier to wildlife movement.

No heritage resources have been directly impacted by roads, or are in proximity to roads that could increase access for potential looting or vandalism. Location, and vegetation largely screen the existing road system from view; the project meets Visual Quality Objectives (VQOs) established by the Forest Plan. The project contains no roadless areas and is outside of Inventoried Roadless Areas. The Lolo National Forest Plan is consistent with the Rule.

Road Maintenance Costs

The annual cost to maintain National Forest System Roads in the project area is estimated to be \$3971 (Table 37); approximately 2.8 percent of the average annual forest maintenance budget.¹⁴

Table 37. Cruzane Mountain Project Area - Road Maintenance Costs

Operational Maintenance Level	INFRA Database Miles	Annual Maintenance Cost	Maintenance Interval (1 in X Years)	Annual Cost/Mile	Total Annual Cost
1 – Basic Custodial Care (Closed)	8.9	\$700	25	\$28	\$251
2 – High Clearance Vehicle	2.0	\$2000	11	\$182	\$351
3 – Suitable for Passenger Cars	3.9	\$3500	4	\$875	\$3,369
Total	14.8				\$3,971

In general, annual maintenance needs (roadside brushing, surface blading, minor drainage structure maintenance, weed spraying) are low because NFS roads were originally designed and constructed to be “self-maintaining” using design features such as road crowning or outsloping, ditching, and properly spaced drainage. Forest Service policy directs engineering, quality control, earthwork, road bases, incidental construction (e.g., culverts, riprap, seeding), and materials.¹⁵

When comparing the cost to maintain arterial, collector, and local roads, annual maintenance costs for National Forest System Roads 288, 3835, and 3845 are the highest because they are open to motorized vehicle travel and are maintained for passenger cars or high clearance vehicles. Other roads in the project area are closed to vehicle travel or are closed by vegetation and in custodial care. The Montana Nightriders Snowmobile Club maintains NFS road 288 for winter snowmobile use (signing, grooming).

¹⁴ Average annual forest maintenance budget is \$140,000. Approximately \$400,000 of additional capital investment funds are available on a 3-year basis for bridge and major culvert replacement and other deferred maintenance activities (average of \$133,000/year). And, an additional \$150,000 are received per year for Aquatic Organism Passage (culvert resizing). In total approximately \$423,000 is available per year for road related maintenance.

¹⁵ Forest Service Pre-Construction (FSH 7709.56) and Construction Handbooks (FSH 7709.57) provide direction on location, survey, design, and construction and reconstruction of roads.

Because National Forest System lands within the project area are suitable for timber management, the existing transportation system was assessed to determine whether it provides adequate access for conventional (ground based tractor) and cable harvest systems. Estimated yarding distances of 1500 feet were used to determine desired road spacing. In addition, slope configuration (convex, concave, and slope steepness) were field measured to determine the optimal location for roads for harvest systems. Based on this analysis, it was determined that additional roads are needed to provide access for timber harvest and removal. The construction of additional roads is necessary to remove hazardous fuels, conduct vegetation management treatments, and transport timber commodities. Several existing roads are “not needed” because they are inappropriately placed on the landscape, or duplicative.

To address fire suppression access needs, high probability fire ignition points, topography, fuel condition, fire spread, safety of ingress and egress, and firefighting tactics were examined. Based on this assessment, it was determined that additional roads are needed to provide safe ingress and egress for wildland fire suppression in the area. Ingress and egress from the north, would provide safe access to the Cruzane Mountain ridgeline. A midslope road and lower slope road (NFSR 18687), could also provide alternative locations for fire suppression on the low-energy (north) aspect, and provide access to suppress firebranding (spotting) that could occur over the Cruzane Mountain ridgeline.

The cost analysis based in coordination with the transportation plan and projected timber harvest area planning process, is very useful in the development of the proposed action. For the Cruzane Mountain Project, both commercial and non-commercial vegetation management are proposed on approximately 1,503 acres. Road maintenance, reconstruction, and new construction are considered including the McManus Creek/road crossing restoration. Costs may potentially be reduced by omitting road deferred treatments or changing road design criteria. Furthermore, the cost could increase if storage or decommissioning is opted on any constructed or reconstructed routes. Miles per road management activity is based on GIS calculated mileage due to temporary roads and new roads not having information available in the INFRA database. The projected cost estimate summary are listed in table below.

Table 38. Projected Road Cost Estimate.

Road No	Functiona l Class	GIS Miles	Cost per Mile	Cost	Remarks
Road Maintenance					
288	Arterial	3.4	\$2,420	\$8,228	Last Maintained 2019
3835	Collector	0.3	\$12,500	\$3,750	2 pipes
3845	Collector	0.3	\$12,500	\$3,750	2 DR
16157	Local	0.5	\$9,000	\$4,500	3 DR
16130	Local	1.0	\$9,000	\$9,000	3-D
16130	N/A	0.4	\$9,000	\$3,600	3-D
37186	N/A	0.2	\$10,000	\$2,000	3-DN
37189	N/A	0.5	\$4,000	\$2,000	3-DN
37033	N/A	0.6	\$14,000	\$8,400	5-D
61417	N/A	0.1	\$9,000	\$900	
		7.3		\$46,128	
Road Reconstruction					
3831	Collector	3.1	\$8,000	\$24,800	
3831	Collector			\$20,000	Remove existing culvert, Install and remove Temp Bridge.

16130	Local	0.7	\$9,000	\$6,300	
18687	Local	1.9	\$8,000	\$15,200	3 planned pipes
37104	N/A	0.6	\$9,000	\$5,400	
37186	N/A	0.3	\$9,000	\$2,700	
37186-A	N/A	0.1	\$9,000	\$900	1 planned pipe
		6.7		\$75,300	
Road Construction					
P-Road 1	Local	1.4	\$60,000	\$84,000	Add to System - 3 planned pipes
37104-Ext	Local	1.8	\$60,000	\$108,000	Add to System - 2 planned pipes
37186-A-Ext	Local	0.7	\$60,000	\$42,000	Add to System - 1 planned pipe
		3.9		\$234,000	
Storage					
16129	Local	2.0	\$10,000	\$20,000	Store 3-SN
		2.0		\$20,000	
Decommission					
3831	Collector	0.9	\$0		Level 3-DN - No treatment
37033	N/A	0.1	\$8,000	\$800	Level 5 - Recontour
16130	N/A	0.4	\$0		Level 3-DN - No treatment
37088	N/A	1.4	\$0		Level 3-DN - No treatment
37323	N/A	1.1	\$0		Level 3-DN - No treatment
37323-A	N/A	0.1	\$0		Level 3-DN - No treatment
37368	N/A	0.7	\$0		Level 3-DN - No treatment
37369	N/A	0.4	\$0		Level 3-DN - No treatment
37370	N/A	0.3	\$0		Level 3-DN - No treatment
		5.4		\$800	
Temporary Roads					
T-1	N/A	0.1	\$9,000	\$900	Timber Sale – Decom after use
T-2	N/A	0.2	\$9,000	\$1,800	Timber Sale – Decom after use
T-3	N/A	0.4	\$9,000	\$3,600	Timber Sale – Decom after use
T-4	N/A	0.9	\$9,000	\$8,100	Timber Sale – Decom after use
T-5	N/A	0.7	\$9,000	\$6,300	Timber Sale – Decom after use
T-6	N/A	0.7	\$9,000	\$6,300	Timber Sale – Decom after use
T-7	N/A	0.5	\$9,000	\$4,500	Timber Sale – Decom after use
T-8	N/A	0.5	\$9,000	\$4,500	Timber Sale – Decom after use
T-9	N/A	0.4	\$9,000	\$3,600	Timber Sale – Decom after use
		4.4		\$39,600	
Grand Total					
		29.7		\$415,828	

Project feasibility, financial efficiency, economic impacts, and environmental justice

This section delineates the affected area, assesses potential environmental justice impacts, and outlines methods and results of analyzing the economic effects of the Cruzane Mountain project, including the project feasibility, financial efficiency, and economic impacts. Project feasibility and financial efficiency relate to the costs and revenues of doing the action. Economic impacts relate to how the action affects the local economy in the surrounding area.

When reading this effects section, one needs to keep in mind the difference between the entire project and the timber sale portion of the project. This project may include multiple commercial timber sales as well as non-commercial activities. All activities would have both market (financial) and non-market costs and benefits associated with them. The non-market aspects of each proposed activity are described in other resource sections of the Environmental Assessment and the respective specialist reports. This analysis calculated the jobs and labor income associated with the processing of the timber products harvested and conducting other resource activities not tied to commercial sales. Timber products harvested from the proposed project and the non-timber activities would have direct, indirect, and induced effects on local jobs and labor income. To estimate jobs and labor income associated with timber harvest, this analysis assumed only sawtimber would be harvested as a result of the proposed action. In order to estimate jobs and labor income associated with reforestation and restoration activities, expenditures for these activities were developed by resource specialists experienced with each type of activity. Only the expenditures associated with the contracted activities are included in the impact analysis.

Direct, Indirect and Cumulative Effects

Project Feasibility

The estimation of project feasibility was based on the Region 1 sale feasibility model, which is a residual value timber appraisal approach that takes into account logging system, timber species and quality, volume removed per acre, lumber market trends, costs for slash treatment, and the cost of specified roads, temporary roads and road maintenance. The appraised stumpage rate from the feasibility analysis was compared to base rates. In this case the minimum rate of \$19.49 per hundred cubic feet (CCF) was used. The appraised stumpage rate and base (minimum) rates for each alternative are displayed in Table 39. For the proposed action, the appraised stumpage rates are slightly higher than the base rate, indicating that this proposal is feasible (likely to sell).

Table 39. Project Feasibility and Financial Efficiency Summary (2017 dollars)

Category	Measure	No Action Alternative	Proposed Action
Timber Harvest Information	Acres Harvested	0	1,411
	Volume Harvested (CCF)	0	22,715
	Base Rates (\$/CCF)	\$0	\$11.37
	Appraised Stumpage Rate (\$/CCF)	\$0	\$19.49
	Predicted High Bid (\$/CCF)	\$0	\$25.14
	Total Revenue (Thousands of \$)	\$0	\$571
Timber Harvest & Required Design Criteria	PNV (Thousands of \$)	\$0	\$72
Timber Harvest & All Other Resource Activities	PNV (Thousands of \$)	\$0	-\$210

Financial Efficiency

The financial efficiency analysis is specific to the timber harvest and restoration activities associated with the alternatives (as directed in Forest Service Manual 2400-Timber Management and guidance found in Forest Service Handbook 2409.18). Costs for sale preparation, sale administration, regeneration, and restoration activities are included. All unit costs, quantities, and timing of activities were developed by the specialists on the project's interdisciplinary team. If exact costs were not known, the maximum of the cost range was used to produce the most conservative present net value (PNV) result. If actual costs are lower, all else equal, PNV would be higher than the estimates for the proposed action in Table 39. The expected revenue for each alternative is the corresponding predicted high bid from the sale feasibility analysis, multiplied by the quantity of timber to be harvested. The predicted high bid is used for the expected revenue (rather than the appraised stumpage rate) since the predicted high bid is the best estimate of the high bid resulting from the timber sale auction. The PNV was calculated using a 4% real discount rate over the seven-year project lifespan (2019-2026). For more information on the values or costs, see the project file.

This analysis is not intended to be a comprehensive benefit-cost or PNV analysis that incorporates a monetary expression of all known market and non-market benefits and costs that is generally used when economic efficiency is the sole or primary criterion upon which a decision is made. Many of the values associated with natural resource management are best handled apart from, but in conjunction with, a more limited benefit-cost framework. These values are discussed throughout the Environmental Assessment, for each resource area.

Table 39 summarizes project feasibility and financial efficiency, including the base rates, appraised stumpage rate, predicted high bid, total revenue, and PNV for each alternative. Because not all costs of the project are related to the timber sales, two PNVs were calculated. One PNV indicates the financial efficiency of each alternative, including all costs and revenues associated with the timber harvest and required design criteria. A second PNV includes all costs for each alternative with the required design criteria and for the timber harvest and all other resource activities. The costs of other resource activities used in the PNV calculations can be found in Table 40 with the exception of sale preparation costs of \$12.50 per CCF and sale administration costs of \$8.50 per CCF. However, the cost of sale preparation and sale administration are considered in PNV for all alternatives.

Results shown in Table 39 indicate that proposed action is financially efficient (positive PNVs) for the timber harvest with designed criteria. However, the proposed action is financially inefficient (negative PNV) when the other resource activities are added to the timber harvest, indicating that those activities will need to be funded outside of the timber sale. The other resource activities that influence this calculation are summarized in Table 40. The No Action Alternative has no costs or revenues associated with it.

A reduction of PNV in any alternative as compared to the most efficient solution is a component of the economic trade-off, or opportunity cost, of achieving that alternative. The no action alternative would not harvest or take other restorative actions and, therefore, would incur no costs. As indicated earlier, many of the values associated with natural resource management are non-market benefits. These benefits should be considered in conjunction with the financial efficiency information presented here. These non-market values are discussed in the various resource sections found in this the environmental assessment.

When evaluating trade-offs, the use of efficiency measures is one tool used by the decision maker in making the decision. Many things cannot be quantified, such as safety, effects on wildlife and the restoration of watersheds and vegetation. The decision maker takes many factors into account in making the decision.

Other Resource Activities and Appropriated Dollar Activities

Table 40 displays the other resource activities not associated with the commercial harvest, and thus not included in the appraisal. These activities will occur as funding becomes available. These activities associated with this project are weed spraying, non-commercial thinning, fuel break construction with piling and burning of fuels and prescribed fire in non-commercial areas. The cost for activities listed below are based on recent experienced cost and professional estimates. Other Resource Activity costs are included in the PNV calculation for Timber Harvest And other Resource Activity, but they are not included in the PNV calculation for Timber Harvest and Required Design Criteria.

Table 40: Other Resource Activity Costs

	No Action Alternative	Proposed Action
	Total Cost	Total Cost
Weed Spraying	\$0.00	\$3,825
Non-commercial thinning	\$0.00	\$11,550
Fuel breaks and piling and burning of fuels	\$0.00	\$35,000
Prescribed fire in non-commercial areas	\$0.00	\$332,200
Total Costs	\$0.00	\$382,525

A job (as defined in IMPLAN) is an annual average of monthly jobs. This is a standard convention and consistent with methods used by the U.S. Bureau of Labor Statistics. When jobs are counted this way, one cannot tell from the data the number of hours worked or the proportion that are full or part-time or anything about seasonality; only that they are yearlong. These jobs are different than full time equivalent (FTE) jobs.

Table 41. Economic Impacts (Employment and Labor Income), Total and Annual in 2017 dollars

	Alternatives		
	Proposed Action	No Action	
Non-Timber Activities			
Part and Full Time Jobs Contributed	Total	Annual	Total
Direct	3	1	0
Indirect and Induced	1	0	0
Total	4	1	0
Labor Income Contributed (Thousands of 2017 \$)			
Direct	\$117	\$20	\$0
Indirect and Induced	\$36	\$6	\$0
Total	\$154	\$26	\$0
Timber Harvest			
Part and Full Time Jobs Contributed	Total	Annual	Total
Direct	58	12	0
Indirect and Induced	81	16	0
Total	139	28	0
Labor Income Contributed (Thousands of 2017 \$)			
Direct	\$2,812	\$562	\$0
Indirect and Induced	\$2,969	\$594	\$0
Total	\$5,781	\$1,156	\$0

All Activities			
Part and Full Time Jobs Contributed	Total	Annual	Total
Direct	61	12	0
Indirect and Induced	82	16	0
Total	143	28	0
Labor Income Contributed (Thousands of 2017 \$)			
Direct	\$2,929	\$582	\$0
Indirect and Induced	\$3,005	\$600	\$0
Total	\$5,934	\$1,182	\$0

Table 41 displays the direct, indirect and induced, and total estimates for employment (part and full-time) and labor income that may be attributed to each alternative. Since the expenditures occur over time, the estimated impacts of jobs and labor income would be spread out over the life of the project. It is important to note that these may not be new jobs or income, but rather jobs and income that are supported by this project. These impacts are shown both in total (over the life of the project) and on an annual basis. It is anticipated that the timber harvest would occur over a five-year period, with the other resource activities spread out over four years after timber harvest. This means that the impact of timber harvest to jobs and labor income would occur prior to impact of jobs and labor income associated with other resource activities. However, implementation could take longer than anticipated due to unforeseen circumstances.

Environmental Justice

The CEQ's Environmental Justice Guidelines for NEPA (1997), "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis."

Table 42 shows that the total share of all minority populations represented less than 10 percent of the population within each county, the combined county affected area, as well as in the state. Thus, the U.S. Census data suggest minority populations within the analysis area do not meet the CEQ's Environmental Justice criterion.

Table 42. Population by Race, 2017

Percent of Total	Mineral	Sanders	Montana	County
White alone	97.6%	92.1%	89.0%	93.5%
Black or African American alone	0.2%	0.1%	0.4%	0.1%
American Indian alone	0.3%	3.6%	6.5%	2.8%
Asian alone	0.2%	0.5%	0.7%	0.6%
Native Hawaiian & Other Pacific Is. alone	0.0%	0.0%	0.1%	0.0%
Some other race alone	0.2%	0.3%	0.5%	0.2%
Two or more races	0.1%	3.4%	2.8%	2.7%

Poverty is an important indicator of economic well-being. For public land managers, understanding the extent of poverty is important for several reasons. First, people with limited income may have different needs, values, and attitudes as they relate to public lands. Second, proposed activities on public lands may

need to be analyzed in the context of whether people who are economically disadvantaged could experience disproportionately high and adverse effects.

Poverty rates are often reported in aggregate, which can hide important differences. Table 43 shows poverty for various types of individuals and families. This is important because aggregate poverty rates (for example, families below poverty) may hide some important information (for example, the poverty rate for single mothers with children).

CEQ guidance on identifying low-income populations states that "...agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (e.g., migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect." Low-income populations are defined, based on the 2016 Census standard, as persons living below the poverty level (based on total income of \$24,300 for a family household of four). Persistent poverty status requires a county to have experienced an individual poverty rate in excess of 20 percent for several Census years. From 2011-2015, 20.9 percent of the population of the County Region affected were living below the poverty level. Sanders County alone from 2011-2015 had 21.2 percent of the population living below the poverty level while Mineral County had 20.1 percent of population living below the poverty level. Based on this data, the characteristic of persistent poverty is present across the whole analysis area (Table 43). This project is not expected to have any negative economic effects on the population within the affected area.

The Executive Order (Executive Order (E.O.) 12898 - Federal Actions to Address Environmental Justice) also directs agencies to consider patterns of subsistence hunting and fishing when an action proposed by an agency has the potential to affect fish or wildlife. The project is not expected to negatively impact wildlife species traditionally depended on for subsistence hunting/fishing activities (see Wildlife section).

Table 43. Poverty, 2017

	Mineral County	Sanders County	Montana	County Region
Percent of Total				
People Below Poverty	20.1%	21.2%	14.4%	20.9%
Families Below Poverty	13.6%	14.8%	9.1%	14.5%
* The data in this table are calculated by ACS using annual surveys conducted during 2011-2015 and are representative of average characteristics during this period.				

Summary of Effects

Implementation of the proposed action would harvest some timber and provide some revenue and would expend government funds to conduct restoration work. Table 39 displays a comparison of the predicted high bids, predicted revenue and estimated PNVs for each alternative which is the discounted version of the financial total revenue and costs over the life of the project, when the commercial and non-commercial activities are combined. The cost of the activities not related to timber harvest activities are summarized on Table 40. For the proposed action, sale of timber in this project would recover the economic value of forest products in a timely manner to contribute to employment and income in local communities. The proposed action would also reduce hazards threatening human health and safety as well as re-establish forested conditions and/or facilitate to meet management objectives outlined in the Forest Plan. These proposed actions would also support existing jobs through timber harvest-related and other resource activities. If timber products other than sawlogs such as posts, poles, firewood, and/or house logs were harvested from these units, some additional employment and labor income would be contributed.

Consistency with Laws, Regulation and Policy

Based on the effects analysis disclosed in this environmental assessment and the evidence included in the project file, the proposed action is consistency with the Lolo National Forest Plan, as amended (1986), as well as the following applicable laws, regulations, and policies:

Various Forest Service Manual and Handbook Direction:

Forest Service Manual 2470 – Silviculture Practices; Forest Service Handbook 2409.17 - Silvicultural Practices Handbook; Forest Service Handbook 2409.26b - Reforestation Handbook; Forest Service Handbook 2409.26f - Seed Handbook; Forest Service Handbook 2409.19 - Knutson-Vandenburg Fund Handbook; Forest Service Handbook 2409.21e - Timber Management Control Handbook; Forest Service Manual 2471.1 (R1 Supplement 2400-2001-2); Forest Service Manuals 2670-2671 - Threatened, Endangered and Sensitive Plants and Animals; Forest Service Manual 2500 - Watershed and Air Management; Forest Service Manual 2550 - Soil Management; Forest Service Manual 2550 - Soil Management, R1 Supplement 2500-2014-1; Forest Service Handbook 2509.22. - Soil and Water Conservation Practices Handbook; R-1/R-4 1988 National Forest Management Act; Forest Service Handbook 5109.19 - Fire Management Analysis and Planning Handbook; Forest Service Manual 2020 - Ecosystem Restoration; Forest Service Manual 2900 – Invasive Species Management; Forest Service Manual 2259.03 – Noxious Weeds; Forest Service Manual 2360 – Heritage Program Management; Forest Service Manual 5130 - Wildland Fire Suppression; Forest Service Manual 5140- Fire Use; and all applicable associated Regional supplements.

Laws and Regulations:

National Environmental Policy Act, 1970, as amended; Clean Water Act, 1972, as amended; Endangered Species Act, 1973, as amended; National Forest Management Act, 1976, as amended; Clean Air Act, 1970, as amended; 2005 Council of Environmental Quality Regulations (reprint); Bull Trout Threatened Status Ruling, Bull Trout Critical Habitat Designation, Forest Service Bull Trout Conservation Strategy and Coterminous United States Bull Trout Recovery Plan; Anderson-Mansfield Reforestation and Revegetation Act of 1949; Bankhead-Jones Farm Tenant Act of 1937; Economy Act of 1932, Act of June 30, 1932; Executive Order 12898 - Federal Actions to Address Environmental Justice; Executive Order 11990 Wetlands Management; Executive Order 13112, Invasive plants; Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act (NFMA) of 1976 (16 U.S.C. 1600-1614); Granger-Thye Act of 1950 (64 Stat. 82, as amended; 16 U.S.C. 490); Healthy Forests Restoration Act (HFRA) of 2003 (16 U.S.C. at 1611-6591); Knutson-Vandenberg Act of 1930 (46 Stat. 527, as amended; 16 U.S.C. 576 - 576b); Montana County Noxious Weed Management Act (MCA 7-22-2101); Multiple-Use Sustained-Yield Act of 1960 (Pub. L. 86-517, 74 Stat. 215; 16 U.S.C. 528-531); National Historic Preservation Act (NHPA) of 1966 (amended in 1976, 1980, and 1992); Federal Regulations 36 CFR 800 (Protection of Historic Properties), 36 CFR 296 (Protection of Archaeological Resources); Organic Administration Act of 1897 (30 Stat. 34, as supplemented and amended (16 U.S.C. 473-478); Plant Protection Act of 2000 (7 U.S.C. 7701 et seq) as amended by the Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412); Reciprocal Fire Protection Act, Act of May 27, 1955 (42 U.S.C. 1856); Reforestation Trust Fund, Title III - Reforestation, Recreation Boating Safety and Facilities Improvement Act of 1980 (16 U.S.C. 1606a, as amended); Supplemental National Forest Reforestation Fund Act of 1972 (87 Stat. 242, 245, as amended; 16 U.S.C. 576c-576e); The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (16 U.S.C. 1600-1614) (as amended by National Forest Management Act (NFMA) of 1976 (16 U.S.C. 472a) Sections 3, 5, 6;

Title 17, Chapter 8, Subchapter 6 of the Administrative Rules of Montana (ARM); Wildfire Suppression Assistance Act, Act of April 7, 1989 (42 U.S.C. 1856).

No Action Alternative

A summary of some of the anticipated environmental impacts of not carrying out the proposed action is included here for comparison and some sections under the proposed action also include additional comparison information.

The need for proposed action supports the concept that without management actions proposed within the project area, the forest health impacts and risk of a high severity fire within the project area would continue to exist and further progress the area away from the desired future conditions outlined in the Forest Plan. The low genetic quality of existing forests and the impacts that are affecting the project area would continue to result in high mortality rates as

Fuel conditions would continue to trend towards the following:

- The south slopes would continue to have increasing long-needle litter accumulations, poor winter range values due to dying woody shrubs, increasing conifer regeneration encroachment (ladder fuel development) and increasing crown closures that may provide ideal conditions for crown fire initiation.
- The north slopes and the valley bottoms would continue to be affected by mountain pine beetle-caused mortality with standing dead trees continuing to fall, increasing surface fuel loadings, and encouraging tree regeneration. Mixed species stands would continue to mature with resulting dense stands, high fuel loadings and large amounts of ladder fuels. Crown density and continuity will continue to become even more dense and continuous.

Efficiencies of firefighters would not be increased. Initial attack of a wildland fire (line construction, holding, and mop-up) becomes more difficult when heavy fuel loadings are encountered, aerial fuels become involved with fire, and danger trees are present. Actions on large fires are only compounded by those same issues associated with initial attack.

Chances for crown fire development would not be lessened. Heavy surface fuels and ladder fuels would facilitate torching and spotting. Options for backfiring or burnout would be limited. Where tree crowns are horizontally continuous, there may be crown fire runs that compromise the fireline and increase risk to firefighters.

Fire intensity and severity would not be reduced. Overstory mortality would be high. Fireline intensity could preclude the use of direct attack by hand crews. There would be more snags and hazard trees that need to be felled for firefighter safety.

Firefighter ingress and egress would not be improved. Limited access for firefighting personnel would make response times substantially longer. With no treatment along the existing road systems and very limited road access to the project area, firefighter access and safety could become severely compromised.

The current scenic composition of the project area, at least immediately is retained. The project area would continue to be uniform and lacking in form, line, color, texture, and pattern diversity. The project area would remain harmonious in appearance although the harmonious composition could be susceptible to being lost due to an uncharacteristic wildfire or insect and disease event that is not within the historic range of variability.

The scenery resource condition as an overstocked forested stands would continue to be under ever greater stress. These increasing stressors may make the scenic composition of the area increasingly unstable and susceptible to a widespread scenic character altering event. If such an event should occur the deviations from the scenic character would likely be retained for many decades until new vegetation growth diminishes the appearance of the event. In the short-term all acres will meet or exceed. In the long-term the resilience of all acres to maintain their visual quality objectives is low.

Scenic homogeneity across the project area would increase creating a less resilient scenic character over time. While the project area currently meets or exceeds the visual quality objectives outlined in the forest plan it would be susceptible to shifting swiftly to a condition that is not meeting the visual quality objectives, due an uncharacteristic disturbance event. The resource indicators and measures would remain unchanged or slowly degrade from the existing conditions.

From the viewing platforms identified with views into the Cruzane project area there are very few that have wider panorama views beyond the project area with the exception of being able to see both the north side of the canyon where Cruzane is and the south side of the canyon from Interstate 90, the St. Regis River, and the Milwaukee Grade Trail. The south side of the canyon includes some parcels of private land surrounded by forest service lands. There is a distinct edge formed at the boundary between the ownerships which is discernible from the eastern most viewing platforms along the Interstate. While this area is not within the project area there is a cumulative effect to the scenic composition of the No Action alternative. This contrast of management actions would continue to be retained and the boundary discernible. It is highlighted due to the density of canopy on the north side of the canyon compared to the south side. Farther to the east of the project area where mixed ownership becomes more prevalent there is further discernible differences at boundaries of ownership as well as due to management actions within these areas. Again while these areas are outside of the project area, views from some points along the Interstate viewing platform encompass these other areas. The contrast in canopy density created pattern and texture differences would remain under the No Action alternative.

Fire being suppressed has had the greatest influence on the scenic composition of the area. Fire suppression is primarily responsible for the lack of diversity in the vegetation composition across the project area and the homogenous appearance of Cruzane Mountain. The tree density and in turn the lack of open canopy is influenced by the lack of fire on the landscape as well. Fire historically would have opened the canopy up and thinned stands as well as selected for larger trees that are more likely to survive fire. Continued fire suppression actions in the future are likely to promote further departure from a stable scenic character that is capable of absorbing large scale disturbance events and remain aesthetic. The no action alternative would retain a larger acreage of the project area in a state of instability due to these suppression activities in the past and probable suppression activities in the future. The no action alternative would also retain the homogenous scenic expression currently seen within the project area.

Noxious weeds populations currently present would increase within the project area. The majority of weed spread has been and would likely continue to occur along roadsides and trails (both wildlife and manmade) where seeds are introduced by human and wildlife activity. The weeds along these vectors would likely to move into adjacent areas if the conditions in those areas are conducive to establishment. No additional ground disturbing activities would occur, which maintains the current extend of detrimental soil disturbance nor associated spread of noxious weeds through soil disturbance.

The No Action alternative would maintain the existing condition and relative impacts from the current road system and National Forest System lands. There would be no direct effects to water quality because no activities would occur. The most likely scenario is that fish habitat and populations in the project area would remain near their existing conditions.

Woody debris recruitment to stream channels in the project areas watershed would remain unchanged from current conditions. Recruitment would continue to occur from natural causes, such as bank erosion, windthrow, disease, and mass wasting. Tree diameters would slowly increase and key pieces of large woody debris would eventually be recruited to the channel. Woody debris would not be added to project area streams. Stream temperatures would remain unchanged where the canopy closure currently provides adequate stream shading; it should be noted that modeling indicates stream temperatures will still increase due to other factors.

Road densities in the project watershed would remain unchanged. Road maintenance would continue on system roads, but likely at longer intervals between maintenance. Unclassified roads and specified roads that are already vegetated with brush and trees would be maintained in this condition and continue to be undisturbed. Drainage and culvert problems on closed system roads and unclassified roads would remain in undesirable condition. Surface erosion rates in the project areas would remain unchanged from current levels. Fish passage barriers and undersized culverts would still be present in the project area and be at risk of failure and subsequent downstream sedimentation.

Future conditions would continue to be affected by both natural events and multiple ongoing actions (e.g., road maintenance, recreation, etc.). Reductions in Forest Service funding for roads, and the shifting of regional priorities to other river basins, make it unlikely that any significant road decommissioning will take place in these watersheds with Forest Service funding in the near future. Routine road maintenance will continue on open systems roads, but likely at longer intervals between maintenance activities. The project area is on a slow, trend toward recovery, but is still seeing impacts from riparian adjacent roads that has overall increased sediment loads, decreased large woody debris inputs, and decreased quality complex aquatic habitat. It is not meeting reference conditions, and given the anthropogenic influences, would not be expected to reach this condition.

Under the No Action alternative, no timber harvest, vegetation treatments, road improvements, aquatic restoration, weed treatments, nor any other restoration activities would occur in the project area in the foreseeable future. The public would incur no costs, nor realize any benefits of timber harvest or other project activities in this area. The No Action alternative would yield a present net value of 0. However, the NEPA planning cost for this alternative will have already been incurred, representing a sunk cost. There would be no return on the planning cost already incurred.

The No Action alternative has the potential to continue the decline of timber-related employment in the rural communities of the economic impact area. Continued decline in timber harvest from National Forest System lands could potentially impact wood product employment and associated indirect and induced employment. A 2009 report by Spelter, McKeever and Toth states many of the forests in the West are publicly owned, and supply from these lands have contracted (decreased) because of changes in management practices and conservation policies. Since January of 2007, twenty six sawmills have experienced permanent closure. Most negatively affected were the states of Montana and California, whose losses in this period (2007-2009) were 26% and 25% respectively (Spelter et al. 2009). Between 2004 and 2009 six large mills and numerous small mills in Montana closed permanently. The January 2010 closure of the Smurfit-Stone Container linerboard facility in Frenchtown cost the state's forest products industry its largest single employer and largest user of wood fiber. Operations at most other facilities were curtailed in 2009 and 2010. Timber processing capacity dropped from 934 MMBF in 2004 to 606 MMBF in 2009. Capacity utilization, which normally exceeds 70 percent, dropped to 50 percent in 2009 (McIver et al 2012). A 2015 Forest Products Outlook reports state that their 2014 survey that log supply has affected milling facilities across the state in 2014 and will continue into 2015 ({Morgan, Todd A.; Hayes, Steven W.; Sorenson, Colin B.; Keegan III, Charles E. 2015. Montana's forest Products Industry Still Looking for the "Real" Homebuilding Recovery. Forest Products Outlook, Bureau of

Business and Economic Research.

<http://www.bber.umt.edu/pubs/forest/outlook/forestproducts2015.pdf>)). Cumulative loss in timber-related jobs could affect the remaining infrastructure and capacity of the local rural communities, and could disrupt the dependent local goods and service industries.

The No Action Alternative maintains no jobs nor would income because there are no activities associated with this alternative, therefore the proposed action generates more jobs and labor income. The No Action alternative has the potential to continue the decline of timber-related employment in the rural communities of the economic impact area. Continued decline in timber harvest from National Forest System lands could potentially impact wood product employment and associated indirect and induced employment. Cumulative loss in timber-related jobs could affect the remaining infrastructure and capacity of the local rural communities, and could disrupt the dependent local goods and service industries.

Agencies or Persons Consulted

The Forest Service consulted individuals, Federal, State, tribal, and local agencies throughout the development of this project and environmental analysis. Those who received notification and coordination with:

- Local government agencies included from Mineral, Sanders, and Missoula Counties;
- State agencies included the MT Department of Transportation, Dept. of Environmental Quality, Fish, Wildlife & Parks, Department of Natural Resources Commission, and State Historical Preservation Office.
- Tribal coordination has occurred with the Nez Perce Tribe.
- In addition to these entities, notices for different public engagement opportunities have been provided to 198 individuals, educational institutions, and groups.

Prior to scoping, public meetings were held in October 2018 (50 notices sent; 21 attendees) and April 2019 (258 notices sent; 21 attendees). Notices for these meetings were also placed in local newspapers and posted at various locations to encourage participation. In June 2019, a notice requesting input during the scoping period was sent to 258 individuals, organizations, and groups. A legal notice was also included in the newspaper of record, the *Missoulian*, and a news release provided to the Mineral Independent. Ten responses were received and considered during the finalization of the proposed action and framing the analysis for this assessment. This legal notice also initiated the required 60-day public notification of the proposed actions consideration of opening larger than 40-acres (see proposed action). Additionally, the Forest held a public field meeting in June 2019 to visit areas of similar vegetation treatments previously completed on a nearby project area. Notices were sent to 255 individuals, groups, and organizations (11 attendees).

Notification of the 30-day comment period for this environmental assessment is being sent to 244 individuals, groups, and organizations (as described above). A legal notice will be published in the newspaper of record, the *Missoulian*, on March 2nd, 2020. A news release will also be available on the Lolo National Forest website and available for publication in the local newspaper, the Mineral Independent.

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Appendix A – Vegetation Management Unit Treatments Table

Unit ID	Acres	Treatment	Target Species	Regeneration Type	Yarding	Operations	Slash	Disposal	Site Preparation	Large Opening ID	Subunit
5	8.4	Commercial Thin	PP	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	Southern
6	14.2	Commercial Thin	PP	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	Southern
8	9.6	Commercial Thin	PP	N/A	Whole tree yarding	E	Damaged	Underburn	N/A	N/A	Southern
12	17.1	Commercial Thin	PP	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	Southern
13	13.2	Commercial Thin	PP	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	Southern
16	5.9	Commercial Thin	PP/WL/DF	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	Southern
20	68.8	Commercial Thin	PP	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	Southern
25	46.6	Commercial Thin	WL	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	West\ East
28	48.8	Commercial Thin	WL	N/A	Whole tree yarding	T	Damaged	Underburn	N/A	N/A	West\ East
30	27.8	Commercial Thin	WL	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	West
49	34.7	Commercial Thin	WL	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	West\ East

57	18.0	Commercial Thin	WL	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	West\ East
60	7.7	Commercial Thin	WL/PP	N/A	Whole tree yarding	T/S	all	Grapple pile/burn	N/A	N/A	East
62A	21.1	Commercial Thin	WL/WWP	N/A	Whole tree yarding	T	all	Grapple pile/burn	N/A	N/A	West
62B	19.1	Commercial Thin	WL/WWP	N/A	Whole tree yarding	T	all	Grapple pile/burn	N/A	N/A	West
62C	5.8	Commercial Thin	WL/WWP	N/A	Whole tree yarding	T	all	Grapple pile/burn	N/A	N/A	West\ East
62D	6.8	Commercial Thin	WL/WWP	N/A	Whole tree yarding	T	all	Grapple pile/burn	N/A	N/A	West\ East
63	18.4	Commercial Thin	WL/WWP	N/A	Whole tree yarding	T/S		Underburn	N/A	N/A	East
64	25.3	Commercial Thin	WL/WWP	N/A	Whole tree yarding	T		Grapple pile/burn	N/A	N/A	East
FB1	5.8	Fuel Break	N/A	N/A	N/A	N/A	N/A	Slash and Hand pile	N/A	N/A	N/A
FB2	8.9	Fuel Break	N/A	N/A	N/A	N/A	N/A	Cut Standing Dead, Slash Hand pile	N/A	N/A	N/A
56	12.7	Improvement Cut	WL	N/A	Whole tree yarding	S	Damaged	Underburn	N/A	N/A	West
58A	12.7	PCT	WL/WWP	N/A	N/A	N/A	N/A	Slash and Hand pile	N/A	N/A	East
58B	14.2	PCT	WL/WWP	N/A	N/A	N/A	N/A	Slash and Hand pile	N/A	N/A	East

59	29.2	PCT	WL/WWP	N/A	N/A	N/A	N/A	Slash and Hand pile	N/A	N/A	East
69	21.0	PCT	WL/WWP	N/A	N/A	N/A	N/A	Slash and Hand pile	N/A	N/A	East
1	86.3	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	T/S	all	Underburn	Mechanical	2	East
2	6.6	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	T/S	all	Underburn	Mechanical	2	East
3	70.7	Regen Harvest	WL/PP/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	2	East
4	11.5	Regen Harvest	WL/PP	Plant WL/PP/WWP	Whole tree yarding	S/HB	all	Underburn	Underburn	3	Southern
7	26.9	Regen Harvest	PP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	3	Southern
9	6.1	Regen Harvest	PP/WL	Natural regeneration	Whole tree yarding	S	all	Underburn	Underburn	3	Southern
10	11.0	Regen Harvest	PP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	3	Southern
11	7.1	Regen Harvest	PP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	3	Southern
14	6.6	Regen Harvest	PP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	3	Southern
15	26.6	Regen Harvest	PP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	N/A	Southern
17	13.0	Regen Harvest	PP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	N/A	Southern

18	12.8	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	N/A	Southern
19	13.4	Regen Harvest	WL/LP	Natural regeneration	Whole tree yarding	T/E	all	Underburn	Underburn	N/A	Southern
21	41.8	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	T	all	Underburn	Underburn	2	East
22	5.6	Regen Harvest	WL/LP	Natural regeneration	Whole tree yarding	S/Tethered	all	Underburn	Underburn	2	East
23	31.4	Regen Harvest	WL/LP	Natural regeneration	Whole tree yarding	S	all	Underburn	Underburn	2	East
24	10.7	Regen Harvest	WL/WWP/LP	Plant WL/PP/WWP	Whole tree yarding	T	all	Underburn	Underburn	2	East
27	25.7	Regen Harvest	WL/LP	Natural regeneration	Whole tree yarding	T	all	Underburn	Underburn	1	West
29	67.2	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	1	West
31	27.2	Regen Harvest	WL/LP	Natural regeneration	Whole tree yarding	T	all	Underburn	Underburn	1	West
32	44.6	Regen Harvest	WL/LP	Natural regeneration	Whole tree yarding	T	all	Underburn	Underburn	1	West
41	4.8	Regen Harvest	WL/LP	Natural regeneration	Whole tree yarding	S	all	Underburn	Underburn	N/A	West
42	53.8	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	T	all	Underburn	Mechanical	3	Southern

43	8.8	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	2	East
44	44.8	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S/Tethered	all	Underburn	Underburn	2	East
45	30.9	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S/Tethered	all	Underburn	Underburn	2	East
46	20.9	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	T	all	Underburn	Mechanical	2	East
47	18.2	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S/Tethered	all	Underburn	Underburn	2	East
48	29.7	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	2	East
50	16.9	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	1	West
51	4.0	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	1	West
52	7.5	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	1	West
53	20.7	Regen Harvest	WL/LP	natural regen	Whole tree yarding	S	all	Underburn	Underburn	1	West
54A	4.8	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	N/A	West
54B	14.1	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	N/A	West

61	35.8	Regen Harvest	WL	Plant WL/PP/WWP	Whole tree yarding	T	all	Grapple pile/burn	Mechanical	N/A	East
65	3.4	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	1	West
66	19.3	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	T	all	Grapple pile/burn		N/A	West
67	41.5	Regen Harvest	WL/WWP	Plant WL/PP/WWP	Whole tree yarding	T	all	Grapple pile/burn		N/A	West
68	37.3	Regen Harvest	WL/WWP/LP	Plant WL/PP/WWP	Whole tree yarding	T	all	Underburn	Underburn	2	East
70	11.5	Regen Harvest	PP	Plant WL/PP/WWP	Whole tree yarding	S	all	Underburn	Underburn	N/A	Southern

Target Species and Regeneration Type (for regeneration harvest units only): WL = Western Larch; WWP = western white pine; LP = lodgepole pine;.

Operations: T = Tractor, S = Skyline, E = Excaline, HB = High Bank, Tethered.

Large Opening ID = 1, 2, or 3; See Figure 8. Cruzane Mountain Proposed Action: Large Openings created from regeneration harvesting.

Appendix B – Applicable Forest Plan Standards for implementation, Project-specific Design Features, and Monitoring

Forest Plan Standards and Direction Applicable to Project Implementation

Forest Wide Standards	
RECREATION	
8	Provide for quality 1/ hunting and fishing opportunities on the Forest by means of habitat manipulation, transportation management and planning, and by coordinating and cooperating with the Department of Fish, Wildlife, and Parks to provide for a wide diversity of hunting and fishing opportunities. 1/ "Quality" includes factors contributing to success in harvesting an animal, numbers of persons engaged in the same activity in the same area at the same time, and general appearance of the area in which the activity is done.
TIMBER	
10	Regional standards will be followed for tree utilization, management intensity, measurement, growth suitability for timber production, tree openings, and silvicultural systems.
12	The guidelines in Appendix G will be used for selecting timber harvest systems during timber sale preparation.
13	Increase the use of the available wood fiber consistent with management objectives and economic principles. Sufficient amounts of woody material will be left to maintain soil fertility. Management emphasis items for tools to accomplishing increased use include:
	a. Transportation planning including road management will be done to enhance timber salvage and firewood removal opportunities.
	b. Increased utilization will be encouraged.
	c. Favor lump sum sales over scaled sales.
	d. Improve information services to inform public and private sectors of the various uses for wood fiber and its availability.
	e. Harvested stands will be regenerated using techniques that encourage natural regeneration.
	f. Regenerated stands will undergo stocking level control when:
	(1) Necessary to meet resource management goals such as wildlife and visual;
	(2) Necessary to obtain future stand yields as projected in the Forest Plan yield tables. Thinning activities generally will only be undertaken when an economic analysis shows positive value increase. However, some thinning will occur where an analysis does not show a positive increase but is needed to meet future timber outputs projected in the Forest Plan. In these cases an economic evaluation will be used to determine the highest priority stands for treatment;
	(3) Necessary to protect stands from fire, insects, or disease where the lands are classified as suitable for timber production.
WATER AND SOILS	
15	The application of best management practices will assure that water quality is maintained at a level that is adequate for the protection and use of the National Forest and that meets or exceeds Federal and State standards.
16	Developmental projects in areas with steep slopes, granitic soils, wet glacial tills, and lake sediments will not be scheduled until they have been analyzed for environmental effects and economic feasibility.

17	A watershed cumulative effects analysis will be made of all projects involving significant vegetation removal prior to these projects being scheduled for implementation. These analyses will also identify existing opportunities to mitigate adverse effects on water-related beneficial uses, including capital investments for fish habitat or watershed improvement.
18	All management practices will be designed or modified as necessary to maintain land productivity.
WILDLIFE AND FISH	
21	Wildlife features such as wallows, mineral licks, and seeps will be protected by employing the following standards, which are subject to change over time, but which reflect the current state of knowledge. Within 5 chains (330 feet) of actively used or recently used wallows, licks, seeps, etc., cover status should be maintained with no more than a 30 percent reduction in existing or normal tree canopy. For an additional 3 chains (198 feet) around the feature, tree canopy removal should be limited to 50 percent. The feature should not be isolated within a larger clearcut unit. Cutting unit boundaries should be adjusted so that the feature is contiguous to forested cover. Skidding equipment should not be permitted within 2 chains of the feature and logging debris should be removed from all trails leading to the feature. It should be recognized that timber management may be necessary in or near such features to maintain the associated values. Harvest entries should be spaced at least 20 years apart and made to improve or maintain the feature. When departure from the above is deemed necessary, interdisciplinary involvement with a wildlife biologist will be required to help develop treatment prescriptions.
23	The document "Coordinating Elk and Timber Management" (Final Report of the Montana Cooperative Elk-Logging Study, 1970-1985) which summarizes the results of 15 years of interagency elk/logging research, will be used as a basic tool for assessing the affects of timber harvest upon elk habitat, and for making decisions that effect the overall big-game resource. When considering activities in lands with intermingled ownership, the effects of activities by all landowners on the big-game resource will be analyzed. Efforts will be made to develop mutually acceptable project designs with other landowners that minimize impacts on wildlife. In some cases, activities on National Forest System land will be deferred or redesigned to mitigate effects of private land management practices.
24	All threatened and endangered species occurring on the Lolo including the grizzly bear, bald eagle, peregrine falcon, and gray wolf will be managed for recovery to nonthreatened status. Forest Service designated essential habitat will provide interim management direction for those species until critical habitat is designated by the Fish and Wildlife Service. Within essential grizzly bear habitat (Management Situation 1), the Forest wildlife biologist will establish vegetative management objectives for all projects that involve vegetative manipulation. Outside of Management Situation 1, where grizzly bear use is suspected or known to occur on an occasional basis (Management Situation 2), schedule activities so as to not conflict with the grizzly bear. If departures from this standard are deemed necessary, the Forest wildlife biologist will assist in developing treatment alternatives. (Management Situations 1 and 2 are defined by the Interagency Grizzly Bear Guidelines.)
25	In the portion of the Forest more than 200 feet from all system roads, sufficient snags and dead material will be provided to maintain 80 percent of the population of snag-using species normally found in an unmanaged Forest. (See Appendix N, Procedures to Implement the Forest Snag Standard.)
26	Provide a variety of hunting recreation opportunities by using project planning and road management to assist the Montana Department of Fish, Wildlife, and Parks in meeting their goal of maintaining long hunting seasons with minimum restrictions.
27	Management practices in essential habitat of threatened and endangered species must be compatible with habitat needs of the species (grizzly bear, gray wolf, bald eagle, and peregrine falcon) consistent with the goal of recovery to nonthreatened status. There are no other known plant or animal species on the Forest that have been identified as threatened or endangered under provisions of the Endangered Species Act of 1973. If and when such habitats are identified, appropriate measures, pursuant to Section 7 of the Endangered Species Act, will be taken to

	protect the species and its habitat consistent with National goals for species recovery to nonthreatened status. Cooperate with future interagency efforts to recover those species for which recovery goals have not yet been defined. For plant and animal species that are not threatened or endangered, but where viability is a concern (i.e., sensitive species), manage to maintain population viability. Habitat for management indicator species, which include the elk, goshawk, and pileated woodpecker, will be monitored. Elk population data, collected by the Department of Fish, Wildlife, and Parks will be compared against habitat data to test elk/habitat relationships. As monitoring technology becomes available for the goshawk and pileated woodpecker, population trends will be monitored. In the interim, habitat parameters including old-growth acres and condition, and snag densities will be monitored as an indicator of population trend.
28	Land management practices shall be designed to have a minimum impact on the aquatic ecosystem, free from permanent or long-term unnatural imposed stress. (A long-term stress is defined as a downward trend of indicators such as aquatic insect density or diversity, fish populations, intragravel sediment accumulations, or channel structure changes that continue for more than 1 hydrologic year as determined by procedures outlined in the Forest Plan Monitoring Requirements.) Project level assessments will address the potential impacts of management activities on off-Forest aquatic resources by considering and evaluating downstream data wherever available.
MINERALS	
38	The Lolo National Forest will preserve corners and legitimate improvements on mining claims during timber harvests or other management activities.
FIRE	
43	Air quality will be maintained at a level that is adequate for the protection and use of National Forest System Lands and that meets or exceeds Federal and State standards. Prescribed fire objectives for smoke management will be met within the constraints established by Montana State Airshed Group's Memorandum of Understanding.
44	A fire management plan complete with prescriptions for unplanned ignition prescribed fires, as appropriate, will be maintained to accomplish management direction and allocation contained in the Forest Plan.
45	An Escaped Fire Situation Analysis will be made for all escaped fires to determine appropriate control measures. (An escaped fire is defined as a fire that exceeds the first calculation of initial attack resources and reasonable reinforcements necessary for prompt control, or exceeds its fire prescription.) All unplanned fire ignitions will be evaluated to determine appropriate response measures, based on values at risk, cost effectiveness, and existence of site specific fire management prescriptions.
ROADS	
48	Motorized vehicles will be limited to system roads and trails which are designated open in the Lolo Forest Travel Plan. Temporary exceptions are authorized for any Federal, State, or local officer, or member of an organized rescue or firefighting force in the performance of an official duty; any vehicle whose use is expressly authorized by the Forest Service under a permit, license, or contract; off-road travel by snowmobiles in areas designated as open in the Travel Plan, and occasional off-road trips for administrative use.
49	Lolo National Forest roads will be the minimum number and meet the minimum design standards possible while still meeting safety, user, and resource needs. This will require that logging system design, timber sale design, and transportation planning be emphasized on all timber sales to comply with this policy. No access roads will be constructed without an approved area transportation analysis and Environmental Assessment, or Environmental Impact Statement if required. Transportation planning will consider the effects of road location, road closures, and road maintenance on affected private landowners.

50	During road design, special emphasis will be placed upon minimizing soil movement. Rolling grades, maximum sustained grades of 8 percent, and stabilization of disturbed areas are design considerations for sensitive soils areas. All designs will be reviewed for compliance with the Forest Plan, project plan, and transportation plan. Drainage design will follow the Forest guidelines for various soil types. Single-lane local and collector roads will be constructed to a 12-foot width with ditch, and 14 feet where no ditch is required. Minimum fill widening and slough widening shall be added as required. (In certain cases where design speed is less than 10 m.p.h. and the design vehicle can be accommodated, a roadway width of 10 feet may be considered, and will require justification and approval by the Forest Supervisor prior to construction.)
51	Road building slash treatment will be the most cost effective that will meet the management prescription in the Forest Plan and project environmental analysis. Scattering will be the first method considered. In areas where scattering is not feasible, the next most cost effective method meeting all the objectives will be used. Providing firewood with the slash treatment method will be considered.
52	Manage Forest roads to provide for resource protection, wildlife needs, commodity removal, and a wide range of recreation opportunities. In most areas on the Forest, this will involve leaving some roads open, closing some roads seasonally, and closing other roads on a permanent basis. Generally, arterial and major collector roads will be left open, whereas local roads will generally be closed. Decisions for road management will be based upon public involvement through the Travel Plan revision process. Primary benefits to be considered are: optimizing big-game production, providing a variety of hunting recreation experiences, protecting critical grizzly bear habitat, reducing sediment in streams, reducing road maintenance costs, and providing for firewood and commodity removal. The criteria to be used to analyze the need for road use restrictions are from the 1984 edition of the Forest Travel Plan and are detailed as follow:
a.	Roads will be closed when necessary to protect the safety of Forest users. Examples include roads with hazards such as avalanche, landslides, forest fires, flooding, and timber harvest operations.
b.	Roads may be closed when roadway use increases soil movement and adversely affects water quality. On sensitive soil areas, wet season restrictions will be applied unless the road has surfacing or other features to make the road suitable for wet season use.
c.	On highly productive big-game summer range, open road densities of existing roads will be restricted to a maximum of 1.1 miles of road per section and all new roads, except arterials, will be closed year-round (average values calculated over designated herd-unit analysis areas). New roads will be closed to the public year-round in areas of moderate big-game summer range, but roads now open (1984 Travel Plan) will remain open. Snowmobiles will be permitted after December 1 unless restricted for other reasons. Roads on low value summer range will remain open unless closed for other reasons.
d.	Areas with high potential for walk-in hunting or fishing experiences will be considered for road closures. Open road density during the hunting season will remain the same as that now existing (1984 Travel Plan) to continue to meet State objectives for big-game hunting recreation.
e.	Roads within grizzly bear habitat may be closed seasonally if it is determined that an open road may be increasing the risk of human-caused bear mortality. Within designated Essential Habitat spring range, all nonarterial systems will be closed April 15 to June 15. On summer range, roads that bisect identified critical habitat components will be closed July 15 thru October 15.
f.	Roads may be closed to help protect known historic or prehistoric sites.

	g.	Temporary closures will be considered for public safety and to mitigate for fire damage, roadway erosion, and similar conditions.
	h.	Road closures will be considered if the cost of road maintenance exceeds the benefits received.
	i.	Road closures and re-openings will be considered when public support and/or concern is expressed through normal channels of communication. Such considerations will be included in the normal Travel Plan revision process.
	j.	Road closures will reflect needs of the public in special circumstances and during the different seasons of the year. Emergency events such as fire suppression and search and rescue activities shall be permitted on closed roads. Activities such as firewood gathering, mining, and berry picking could occur provided the objective of the closure is not compromised.
	k.	The need for protection of administrative or special use facilities will be a consideration for the closure of certain roads. Lookouts, guard stations, and transmission sites are examples of such facilities.
	l.	Roads should be considered for closure when necessary to minimize conflicts between user groups. Examples include conflicts between walk-in hunters and road hunters, cross-country skiers and snowmobilers, horseback riders, and Motorcyclists.
	m.	The quality of dispersed recreation opportunities will be a factor when considering a road closure (providing for four-wheeled motorized recreation in some areas and other forms of motorized recreation in others, where both uses in the same area may result in diminished quality of the recreation experience).
	n.	Road closures will not preclude the use by holders of outstanding valid rights.
	o.	Off-road vehicle use will be limited to those areas designated in the Forest Travel Plan.
	p.	The need to prevent or retard noxious weed spread will be considered for the closure of certain roads.
VISUAL QUALITY		
53		Visual rehabilitation of past management activities will be evaluated where needed during preparation and implementation of the timber sale program.
CULTURAL RESOURCES		
54		Cultural resources will be considered during the planning process for all proposed Forest undertakings. Inventories will be conducted prior to ground disturbing activities as an integral part of project planning. All sites located will be evaluated for possible nomination to the National Register of Historic Places in consultation with the State Historic Preservation Office. Those properties determined eligible for National Register listing will be managed in a manner consistent with the standards specified by the State Historic Preservation Office, the Advisory Council on Historic Preservation, as well as applicable USDA regulations.
55		The Forest will coordinate, on a yearly schedule, with representatives from the Confederated Salish and Kootenai Tribes to discuss the types and location of proposed Forest undertakings. This is a requirement specified within the American Indian Religious Freedom Act to ensure that areas on National Forest System lands which are important to contemporary Native Americans for religious reasons are not inadvertently impacted. Coordination with other Native American groups could occur if there was reason to believe traditional or contemporary religious areas, important to these groups, were present on the Forest.
INSECT AND DISEASE		

56	Implementation of the principles of integrated pest management will be accomplished through sound silvicultural prescriptions. Silvicultural practices will be designed to consider past, current, and potential impacts from insects and diseases.
57	Biological and vegetative management practices will be utilized to control insect and disease infestations. Chemical control will be recommended when other methods are ineffective and only after following all required procedures.
59	<p>All management activities will incorporate appropriate noxious weed prevention measures. Noxious weed control projects will be focused where they have the greatest effect on preventing weed spread or damage to natural resources, and the greatest benefit to people who are actively trying to control weeds on land adjacent to the National Forest. Highest priority will be given to weed control projects in the following four situations:</p> <ul style="list-style-type: none"> • areas that are relatively free of weeds, and trailheads, and roads that lead to those areas; • new infestations and small weed patches that threaten areas at high or moderate ecological risk to weed invasion; • weeds on National Forest System land next to or near other landownerships with active weed control programs; • weeds on administrative sites, developed recreation sites, and pastures will be controlled to serve as demonstration sites for public viewing or to provide weed-free grazing for government packstock. <p>Weed prevention and control will be achieved through the following standards:</p> <p>a. Reduce the spread of noxious weeds into relatively weed-free areas by following the weed prevention measures given in Appendix W. Planning for all projects will include an assessment of current weed conditions on the site, and weed risk factors (as described in: An Evaluation of Noxious Weeds on the Lolo, Bitterroot, and Flathead Forests, B. John Losensky, 1987). Project alternative development and evaluation will consider weed risk and spread prevention factors.</p> <p>b. Noxious weed control projects will follow the planning and implementation guidelines given in Appendix W.</p> <p>c. Livestock will use only certified weed-free feed and straw bedding in designated areas. In established wilderness, any weed-free or bedding requirements will be part of the Limits of Acceptable Change process for each individual wilderness.</p> <p>d. Roads must be constructed through important, relatively weed-free, bunchgrass winter range when effective measures to preclude weed establishment and spread from the road are included in project design and monitoring, and implemented in construction and maintenance. This standard applies to all winter range (inclusions as well as designated winter range management areas) where bunchgrass communities are a significant component of the understory.</p>

MANAGEMENT AREA 13

STANDARDS

3	Timber harvest will be used to moderate changes in streamflow regime and maintain or improve fish and wildlife habitat values, recreation opportunities, and other riparian conditions on that portion of the management area classified as suitable for timber production (53 percent). Tree removal will be limited to that required to eliminate safety hazards and permit road or trail construction on that portion of the Management Area classified as unsuitable for timber production (47 percent).
4	Provide for all wildlife species' needs at a moderate (60 percent population potential) level. High priority habitat projects will be selected and related to recreation opportunities.

5	Maintain natural habitat or restore conditions for indigenous aquatic organisms, including fish, by management of vegetative conditions, channel structure, and limiting those activities or developments that are adverse to these organisms or the aquatic ecosystem.
6	Activities designed to enhance fish and aquatic habitat, wildlife, water quality, or recreation shall be mutually compatible to assure long-term maintenance of these resource values.
7	Fisheries habitat and watershed improvement projects to rehabilitate impacted areas will have priority over improvement projects that involve manipulation of natural conditions.
9	Riparian vegetation, including overstory tree cover, will be left along water bodies as needed to provide shade, maintain streambank stability, desirable pool quality and quality for aquatic organisms, and promote filtering of overland flows.
10	All management activities, especially those that involve earth moving, will be designed to minimize impacts on water quality and other riparian values. Project prescriptions will be developed by an interdisciplinary team, including specialists in soils, hydrology, engineering, wildlife and fisheries biology, and silviculture.
11	Insect and disease detection surveys and evaluations will be accomplished annually. Emphasis will be placed on evaluating hazard potential and determining if efforts are needed to prevent or control losses. These efforts may include: site specific removal of highly susceptible, heavily infected, or infested individual trees.
12	Generally, new roads in riparian zones will be minimized. Exceptions would be areas where road systems must obviously cross or traverse these zones or where total resource needs require road access.
13	Roads will be managed to control use and avoid damage to drainage systems and resource values. Roads will be constructed and managed in a manner to keep sedimentation hazard low.
14	Construction equipment service areas will not be located in this Management Area.
15	Road drainage features will be inspected and maintained in the fall to insure that they will be able to handle spring snowmelt.
16	Roads will be designed to provide low risk of drainage failure and mass failure. The runoff event for which a roadway is designed will vary depending on the length of time the road and its drainage structures and fill embankments at natural drainageways are to be in place before removal.
TIMBER	
18	Log landings or decking areas will be permitted in this Management Area only if the need is justified in an environmental assessment.
Aquatics Environment and Fish Habitat Practices	
20	Streams that contain pure westslope cutthroat trout will be managed specifically for that subspecies.
Fire	
22	To achieve management goals and objectives, prescribed burning may be planned and executed to maintain or restore the composition and structure of plant communities, or for hazard reduction purposes. Wildfires will be confined, contained or controlled as provided for by criteria and guidelines for each fire management unit in the Fire Management Plan. Suppression methods will generally employ the use of hand tools, rather than heavy equipment.
Roads	
23	Roads will be located to cross rather than to parallel streams in this area. Stream buffer strips will be used as a means of minimizing

	sediment transport from disturbed areas. Established erosion control methods will be used to control transportable sediment.
24	Where needed, fish passage will be provided for in stream crossings by maintaining natural flow velocities and channel gradients existing at the crossing site.
25	When flow in a streamcourse is temporarily diverted to accomodate construction or other activities, flow will be restored to the natural course as soon as practical prior to a major runoff season.
26	Riprap or other erosion control activities will be planned and coordinated with the Forest hydrologist and fisheries biologist and be accomplished during the low flow season
Visual Quality	
27	Management activities will be designed to meet the inventoried visual quality objective as seen from viewpoints contained on the Sensitivity Level maps. Both Sensitivity Level maps and Inventory maps are on file. Exceptions may be made when an interdisciplinary team identifies the need to protect other resource values and the resulting VQO is no more than one level below the inventoried visual quality objective.

MANAGEMENT AREA 16	
STANDARDS	
4	Timber harvest will not create runoff increases likely to result in channel degradation. Ground vegetation and soil will be left undisturbed immediately adjacent to all streams and draws. Undisturbed adjacent land shall be of sufficient width to minimize erosion products from entering stream courses. All restoration treatment will be completed during the same construction season in which the disturbance was created.
5	Yarding methods will be used that minimize or eliminate soil disturbance in the riparian zone.
6	Project plans will incorporate considerations for elk summer habitat, deer/elk winter range management, and the unmapped portions of Management Area 26 where those values are present.
7	Riparian vegetation, including overstory tree cover, will be managed along all perennial and intermittent streams with defined channels to maintain cover and temperatures for trout habitat, maintain streambank stability, and promote filtering of overland flows.
9	Wildfires will be confined, contained, or controlled as provided for by criteria and guidelines for each fire management unit in the Fire Management Plan, described in Appendix X. To achieve management goals and objectives, prescribed burning may be planned and executed to maintain or restore the composition and structure of plant communities, or for hazard reduction purposes.
11	Generally, new roads in riparian zones will be minimized. Exceptions would be areas where road systems must obviously cross or traverse these zones or where total resource needs dictate the necessity for roads.
12	Logging and/or construction operations will be conducted in such a way as to prevent debris from entering stream channels. Logs will not be yarded through streams.
13	Construction equipment service areas will not be located in riparian zones in this management area.
14	Roads will be designed to provide low risk of drainage failure and mass failure. The runoff event for which a roadway is designed will vary depending on the length of time the road and its drainage structures and fill embankments at natural drainageways are to be in place before

	removal.
15	Roads will be managed to control use and avoid damage to drainage systems and resource values. Roads will be constructed and managed in a manner to keep sedimentation hazard low.
16	Management practices will follow guidelines for the Modification or Maximum Modification visual quality objective. Modification will normally be assigned to foreground and middleground visible from Sensitivity Level 2 viewpoints. Background and areas not seen from these viewpoints will be assigned Maximum Modification. Maps of these viewpoints, guidelines, and distance zones are on file and must be consulted to determine the visual quality objective.
TIMBER	
18	Timber harvest generally includes varying proportions of clearcutting and shelterwood systems, from 80 percent shelterwood/20 percent clearcut, to 90 percent clearcut/10 percent shelterwood, depending on habitat group, physical site conditions, and silvicultural objectives.
19	Provide for regeneration of a mixture of species with the emphasis on maintaining the components of ponderosa pine and western larch commonly found in naturally occurring stands.
ROAD	
22	Roads will be located to cross rather than to parallel streams in riparian areas. Stream buffer strips will be used as a means of minimizing sediment transport from disturbed areas. Established erosion control methods will be used to control transportable sediment.
23	Where needed, fish passage will be provided for in stream crossings by maintaining natural flow velocities and channel gradients existing at the crossing site.
24	Roads will be constructed as needed to meet the management objectives of the area. Estimated average road densities are: 0 to 40 percent slope = 5.6 miles/square mile; 40 percent plus slope = 6.7 miles/square mile.
25	Prescribed burning will be used to accomplish slash disposal, site preparation, silvicultural, ecological, wildlife, and range objectives. In habitat groups where fire is not a useful tool, logging/scattering tramplng, isolation of separate cutting units, fuel break construction, and fuelwood utilization will be used to reduce fuel accumulations, reduce hazards, and prepare sites for regeneration. Slash disposal will be complete enough to provide for free movement of deer and elk or in the case of isolated units, small enough to avoid impacting major elk/deer through paths. Prescribed burning for natural vegetation enhancement will be prescribed by a certified silviculturist. Use of prescribed fire for hazard reduction and site preparation will be based on an economic analysis. Utilize the most cost effective alternative that will meet the required resource objectives.

MANAGEMENT AREA 24	
STANDARDS	
2	The Management Area is classified as suitable for timber production.
3	Yarding methods will be used that minimize or eliminate soil disturbance in the riparian zone.
4	Logging and/or construction operations will be conducted in such a way as to prevent debris from entering stream channels. Logs will not be yarded through streams.
5	Riparian vegetation, including overstory tree cover, will be managed along all perennial and intermittent streams with defined channels to maintain cover and temperatures for trout habitat, maintain streambank stability, and promote filtering of overland flows.
7	Wildfires will be confined, contained, or controlled as provided for by criteria and guidelines for each fire management unit in the Fire Management Plan, described in Appendix X. To achieve management goals and objectives, prescribed burning may be planned and executed to maintain or restore the composition and structure of plant communities, or for hazard reduction purposes.
8	Insect and disease detection surveys and evaluations must be conducted annually. Using integrated pest management techniques, efforts aimed at preventing or controlling losses from outbreak populations will be necessary at times. These efforts may include removal of highly susceptible, heavily infected, or infested individual trees.
9	Generally, new roads in riparian zones will be minimized. Exceptions would be areas where road systems must obviously cross or traverse these zones or where total resource needs dictate the necessity for roads.
10	Construction equipment service areas will not be located in riparian zones within this Management Area.
11	Roads will be designed to provide low risk of drainage failure and mass failure. The runoff event for which a roadway is designed will vary depending on the length of time the road and its drainage structures and fill embankments at natural drainageways are to be in place before removal.
12	Roads will be managed to control use and avoid damage to drainage systems and resource values. Roads will be constructed and managed in a manner to keep sedimentation hazard low.
13	Project plans will incorporate consideration for elk shelter habitat and deer and elk winter range management where these values are present.
RECREATION	
15	Harvest methods range from 70 percent selection/30 percent shelterwood to 20 percent clearcut/80 percent shelterwood depending on habitat group, physical site condition, visual quality objectives, and silvicultural objectives.
17	Dead or down trees may be salvaged as constrained by habitat needs for cavity nesting wildlife species.
18	Timber harvest will not create runoff increases likely to result in channel degradation. Ground vegetation and soil will be left undisturbed immediately adjacent to all streams and draws. Undisturbed adjacent land shall be of sufficient width to minimize erosion products from entering stream courses. All restoration treatment will be completed during the same construction season in which the disturbance was created.
ROADS	

20	Roads will be located to cross rather than to parallel streams in riparian areas. Stream buffer strips will be used as a means of minimizing sediment transport from disturbed areas. Established erosion control methods will be used to control transportable sediment.
21	Where needed, fish passage will be provided for in stream crossings by maintaining natural flow velocities and channel gradients existing at the crossing site.
22	Roads will be constructed as needed to meet the management objectives of the area. Estimated average road densities are: 0 to 40 percent slope = 4.6 miles/square mile; 40 to 60 percent slope = 4.8 miles/square mile; 60 percent plus = 2.8 miles/square mile. Actual project-level road densities will vary depending upon the following factors: a) habitat type and associated screening and revegetative recover time; b) staging of road construction; c) silvicultural systems employed, together with amount of screening removed each entry; d) logging systems used; and e) amount and type of revegetation measures to be taken.
VISUAL QUALITY	
23	Management practices for all resources will follow guidelines for the Retention visual quality objective from the viewpoints identified as visually sensitive. Maps of these viewpoints are on file in the Supervisor's Office and on the Ranger Districts and will be consulted to visually assess the impacts of management activities. Temporary departures from this visual quality objective may be acceptable under the following conditions: a) long-term visual values require such an action; or b) essential road access into other management areas is impossible without this temporary departure.

MANAGEMENT AREA 25

STANDARDS

2	The Management Area is classified as suitable for timber production.
3	Yarding methods will be used that minimize or eliminate soil disturbance in the riparian zone.
4	Logging and/or construction operations will be conducted in such a way as to prevent debris from entering stream channels. Logs will not be yarded through streams.
5	Riparian vegetation, including overstory tree cover, will be managed along all perennial and intermittent streams with defined channels to maintain cover and temperatures for trout habitat, maintain streambank stability, and promote filtering of overland flows.
7	Wildfires will be confined, contained, or controlled as provided for by criteria and guidelines for each fire management unit in the Fire Management Plan, described in Appendix X. To achieve management goals and objectives, prescribed burning may be planned and executed to maintain or restore the composition and structure of plant communities, or for hazard reduction purposes.
8	Insect and disease detection surveys and evaluations must be conducted annually. Using integrated pest management techniques, efforts aimed at preventing or controlling losses from outbreak populations will be necessary at times. These efforts may include removal of highly susceptible, heavily infected, or infested individual trees.
9	Generally, new roads in riparian zones will be minimized. Expectation would be areas where road systems must obviously cross or traverse these zones or where total resource needs dictate the necessity for roads.
10	Construction equipment service areas will not be located in the riparian zone within this Management Area.
11	Roads will be designed to provide a low risk of drainage failure and mass failure. The runoff event for which a roadway is designed will vary

	depending on the length of time the road and its drainage structures and fill embankments at natural drainageways are to be in place before removal.
12	Roads will be managed to control use and avoid damage to drainage systems and resource values. Roads will be constructed and managed in a manner to keep sedimentation hazard low.
13	Project plans will incorporate considerations for elk summer habitat and deer and elk winter range management where those values are present.
TIMBER	
15	Harvest methods range from 20 percent clearcut/80 percent shelterwood to 30 percent clearcut/70 percent shelterwood depending on habitat group, physical site condition, visual quality objective, and silvicultural objectives.
17	Dead or down trees may be salvaged as constrained by habitat needs for cavity nesting wildlife species.
18	Timber harvest will not create runoff increases likely to result in channel degradation. Ground vegetation and soil will be left undisturbed immediately adjacent to all streams and draws, undisturbed adjacent land shall be of sufficient width to minimize erosion products from entering stream courses. All restoration treatment will be completed during the same construction season in which the disturbance was created.
ROADS	
20	Roads will be located to cross rather than to parallel streams in riparian areas. Stream buffer strips will be used as a means of minimizing sediment transport from disturbed areas. Established erosion control methods will be used to control transportable sediment.
21	Where needed, fish passage will be provided for in stream crossings by maintaining natural flow velocities and channel gradients existing at the crossing site.
22	Roads will be constructed as needed to meet the management objectives of the area. Estimated average road densities are: 0 to 40 percent slope = 5.6 miles/square mile; 40 to 60 percent slope = 5.9 miles/square mile; 60 percent plus = 4.2 miles/square mile. Actual project-level road densities will vary depending upon the following factors: a) habitat type and associated screening and revegetative recovery time; b) staging of road construction; c) silvicultural systems employed, together with amount of screening removed each entry; d) logging systems used; and e) amount and type of revegetation measures to be taken.
VISUAL QUALITY	
23	Management practices for all resources will follow guidelines for the Partial Retention visual quality objective from the viewpoints identified visually sensitive. Maps of these viewpoints are on file in the Supervisor's Office and on the Ranger Districts and will be consulted to visually assess the impacts of management activities. Temporary departures from this visual quality objective may be acceptable under the following conditions: a) long term visual values require such an action; or b) essential road access into other management areas is impossible without this temporary departure.

Northern Rockies Lynx Management Direction

Goal	
Conserve the Canada lynx.	Project area is within an area with little to no lynx presence or effective habitat. See RMRS 2019 lynx habitat model.
All Management Practices and Activities (ALL)	
The following objectives, standards, and guidelines apply to all management projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression, or to wildland fire use.	
Objective ALL O1:	Not applicable
Maintain ²⁶ or restore ⁴⁰ lynx habitat ²³ connectivity ¹⁶ in and between LAUs ²¹ , and in linkage areas ²² .	
Standard ALL S1:	Not applicable
New or expanded permanent development ³³ and vegetation management ⁴⁹ projects ³⁶ must maintain ²⁶ habitat connectivity ¹⁶ in an LAU ²¹ and/or linkage area ²² .	
Guideline ALL G1:	Not applicable
Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways ¹⁸ or forest highways ¹² across federal land. Methods could include fencing, underpasses, or overpasses.	
Standard LAU S1:	Not applicable
Changes in LAU ²¹ boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.	
Vegetation Management Activities and Practices (VEG)	
The following objectives, standards, and guidelines apply to vegetation management projects ³⁶ in lynx habitat within lynx analysis units (LAUs) in occupied habitat. With the exception of Objective VEG O3 that specifically concerns wildland fire use, the objectives, standards, and guidelines do not apply to wildfire suppression, wildland fire use, or removal of vegetation for permanent developments such as mineral operations, ski runs, roads, and the like. None of the objectives, standards, or guidelines applies to linkage areas.	

Objective VEG O1:	Recent data collected after the NRLMD (snow track surveys, bait station surveys, snowshoe hare and horizontal cover surveys, and 2019 RMRS habitat modeling) show the unsuitability of the Cruzanne area for lynx irregardless of past forest management. Therefore, because of the lack of suitability of the Superior RD, and especially this part of the District (Wilkes LAU), targeted management of habitats for lynx would likely preclude positive management for other species such as elk which are common and in need of management in the area. The proposed treatments would continue to provide habitats suitable for lynx moving through on a short-term basis.
Manage vegetation ⁴⁹ to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.	
Objective VEG O2:	
Provide a mosaic of habitat conditions through time that support dense horizontal cover ¹⁹ , and high densities of snowshoe hare. Provide winter snowshoe hare habitat ⁵¹ in both the stand initiation structural stage and in mature, multi-story conifer vegetation.	
Objective VEG O3:	
Conduct fire use ¹¹ activities to restore ⁴⁰ ecological processes and maintain or improve lynx habitat.	Currently (even after the Sheep Gap Fire), only 10% of the LAU is in the early stand initiation structural stage. The LAU is compliant with the standard. The proposed action adds 7 acres (Savenac LAU) and 45 acres (Wilkes LAU) of regen harvest , which would increase the proportion lynx habitat in early stand initiation to 3-4% in the LAUs. Because this is below 30%, the LAUs would remain in compliance with the standard.
Objective VEG O4:	
Focus vegetation management ⁴⁹ in areas that have potential to improve winter snowshoe hare habitat ⁵¹ but presently have poorly developed understories that lack dense horizontal cover.	
Standard VEG S1:	
Where and to what this applies: Standard VEG S1 applies to all vegetation management ⁴⁹ projects ³⁶ that regenerate ³⁸ forests, except for fuel treatment ¹³ projects ³⁶ within the wildland urban interface ⁵⁰ (WUI) as defined by HFRA ¹⁷ , subject to the following limitation:	
Fuel treatment projects ³⁶ within the WUI ⁵⁰ that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a national forest). In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard.	
For fuel treatment projects ³⁶ within the WUI ⁵⁰ see guideline VEG G10.	
The Standard: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages ⁴⁵ limit disturbance in each LAU as follows:	

<p>If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects³⁶.</p>	
<p>Standard VEG S2:</p>	<p>Only about 3% of the LAUs is currently unsuitable, thus far less than 15% has been regenerated in 10 years. Additional regen harvest of 7 and 45 acres would not result in more than 15% of either LAU being regenerated.</p>
<p>Where and to what this applies: Standard VEG S2 applies to all timber management⁴⁷ projects³⁶ that regenerate³⁸ forests, except for fuel treatment¹³ projects³⁶ within the wildland urban interface⁵⁰ (WUI) as defined by HFRA¹⁷, subject to the following limitation:</p>	
<p>Fuel treatment projects³⁶ within the WUI⁵⁰ that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a national forest).</p>	
<p>For fuel treatment projects³⁶ within the WUI⁵⁰ see guideline VEG G10.</p>	
<p>The Standard: Timber management⁴⁷ projects³⁶ shall not regenerate³⁸ more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period.</p>	
<p>Standard VEG S5:</p>	
<p>Where and to what this applies: Standard VEG S5 applies to all precommercial thinning³⁵ projects³⁶, except for fuel treatment¹³ projects³⁶ that use precommercial thinning as a tool within the wildland urban interface⁵⁰ (WUI) as defined by HFRA¹⁷, subject to the following limitation:</p>	<p>No precommercial thinning occurring; precommercial thinning is not proposed in lynx habitat.</p>
<p>Fuel treatment projects³⁶ within the WUI⁵⁰ that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a national forest).</p>	
<p>For fuel treatment projects³⁶ within the WUI⁵⁰ see guideline VEG G10.</p>	
<p>The Standard: Precommercial thinning projects³⁶ that reduce snowshoe hare habitat may occur from the stand initiation structural stage⁴⁵ until the stands no longer provide winter snowshoe hare habitat only:</p>	
<p>1. Within 200 feet of administrative sites, dwellings, or outbuildings; or</p>	
<p>2. For research studies³⁹ or genetic tree tests evaluating genetically improved</p>	

reforestation stock; or	
3. Based on new information that is peer reviewed and accepted by the regional level of the Forest Service, and state level of FWS, where a written determination states:	
a) that a project ³⁶ is not likely to adversely affect lynx; or	
b) that a project ³⁶ is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or	
4. For conifer removal in aspen, or daylight thinning ⁵ around individual aspen trees, where aspen is in decline; or	
5. For daylight thinning of planted rust-resistant white pine where 80 percent of the winter snowshoe hare habitat ⁵¹ is retained; or	
6. To restore whitebark pine.	
<i>Exceptions 2 through 6 shall only be utilized in LAUs where Standard VEG S1 is met.</i>	
Standard VEG S6:	None of the proposed treatments would occur in MMS habitats. These areas (although shown as MMS on broad-scale models (see figure above), were field verified and were not MSS (see notes and photos in project file). The units were field verified to be either single/two story stands, or have very open understories that do not provide habitat for snowshoe hares. See field notes and photos documenting existing conditions in the project file.
Where and to what this applies: Standard VEG S6 applies to all vegetation management ⁴⁹ projects ³⁶ except for fuel treatment ¹³ projects ³⁶ within the wildland urban interface ⁵⁰ (WUI) as defined by HFRA ¹⁷ , subject to the following limitation:	
Fuel treatment projects ³⁶ within the WUI ⁵⁰ that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a national forest).	
For fuel treatment projects ³⁶ within the WUI ⁵⁰ see guideline VEG G10.	
The Standard: Vegetation management projects ³⁶ that reduce snowshoe hare habitat in multi-story mature or late successional forests ²⁹ may occur only:	
1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or	
2. For research studies ³⁹ or genetic tree tests evaluating genetically improved reforestation stock; or	

3. For incidental removal during salvage harvest ⁴² (e.g., removal due to location of skid trails).	
<i>Exceptions 2 and 3 shall only be utilized in LAUs where Standard VEG S1 is met.</i>	
(NOTE: Timber harvest is allowed in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover (i.e., uneven age management systems could be used to create openings where there is little understory so that new forage can grow).	
Guideline VEG G1:	
Vegetation management ⁴⁹ projects ³⁶ should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage ⁴⁶ stands to enhance habitat conditions for lynx or their prey (e.g., mesic, monotypic lodgepole stands). Winter snowshoe hare habitat ⁵¹ should be near denning habitat ⁶ .	High-density conifer stands exist throughout the LAU although they are of poor suitability for lynx. Most of the proposed treatments are targeting improved stand health for ponderosa pine and larch forest types which do not produce lynx habitat at any stage of stand development.
Guideline VEG G4:	
Prescribed fire ³⁴ activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.	The proposed action would not create any travel routes because fire would be ignited by hand or with a helicopter. Constructing permanent firebreaks on ridges or saddles will be avoided.
Guideline VEG G5:	
Habitat for alternate prey species, primarily red squirrel ³⁷ , should be provided in each LAU.	These habitats are abundant throughout the LAUs.
Guideline VEG G10:	
Fuel treatment projects ³⁶ within the WUI ⁵⁰ as defined by HFRA ¹⁷ should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.	The proposed action is compliant with Veg S1, 2, 5, and 6.
Guideline VEG G11:	
Denning habitat ⁶ should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees (“jack-strawed” piles). If denning habitat appears to be lacking in the LAU, then projects ³⁶ should be designed to retain some coarse woody debris ⁴ , piles, or residual trees to provide denning habitat ⁶ in the future.	Denning is extremely unlikely because of the poor habitat for foraging in the project area. The very-low levels of denning habitat which now exist in the project area would remain low except for some remaining logging slash.
Livestock Management (GRAZ)	
The following objectives and guidelines apply to grazing projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat. They do not apply to linkage areas.	No Grazing proposed. None of these are applicable to this project.

Objective GRAZ O1:	
Manage livestock grazing to be compatible with improving or maintaining ²⁶ lynx habitat ²³ .	
Guideline GRAZ G1:	
In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.	
Guideline GRAZ G2:	
In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.	
Guideline GRAZ G3:	
In riparian areas ⁴¹ and willow carrs ³ , livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages ²⁸ , similar to conditions that would have occurred under historic disturbance regimes.	
Guideline GRAZ G4:	
In shrub-steppe habitats ⁴³ , livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs ²¹ , to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	
Human Use Projects (HU)	No human use changes proposed except for the actual vegetation treatments.
The following objectives and guidelines apply to human use projects, such as special uses (other than grazing), recreation management, roads, highways, and mineral and energy development, in lynx habitat in lynx analysis units (LAUs) in occupied habitat, subject to valid existing rights. They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.	
Objective HU O1:	
Maintain ²⁶ the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat ²³ .	
Objective HU O2:	
Manage recreational activities to maintain lynx habitat and connectivity ¹⁶ .	

Objective HU O3:	
Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.	
Objective HU O4:	
Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation ⁹ sites or ski areas.	
Objective HU O5:	
Manage human activities, such as special uses, mineral and oil and gas exploration and development, and placement of utility transmission corridors, to reduce impacts on lynx and lynx habitat.	
Objective HU O6:	
Reduce adverse highway ¹⁸ effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity ¹⁶ , and to reduce the potential of lynx mortality.	
Guideline HU G1:	
When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris ⁴ , so winter snowshoe hare habitat ⁵¹ is maintained.	
Guideline HU G2:	
When developing or expanding ski areas, lynx foraging habitat should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.	
Guideline HU G3:	
Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat ²³ .	
Guideline HU G4:	
For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.	
Guideline HU G5:	

For mineral and energy development sites and facilities that are closed, a reclamation plan that restores ⁴⁰ lynx habitat should be developed.	
Guideline HU G6:	
Methods to avoid or reduce effects on lynx should be used in lynx habitat ²³ when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.	
Guideline HU G7:	
New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity ¹⁶ . New permanent roads and trails should be situated away from forested stringers.	
Guideline HU G8:	
Cutting brush along low-speed ²⁵ , low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.	
Guideline HU G9:	
On new roads built for projects ³⁶ , public motorized use should be restricted. Effective closures should be provided in road designs. When the project ³⁶ is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.	
Guideline HU G10:	
When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat ¹⁰ , if it has been identified as a need.	
Guideline HU G11:	
Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction ¹ , unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of immediately adjacent LAUs.	
This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to access regulated by guideline HU G12.	
Use the same analysis boundaries for all actions subject to this guideline.	

Guideline HU G12:	
Winter access for non-recreation special uses and mineral and energy exploration and development, should be limited to designated routes ⁸ or designated over-the-snow routes ⁷ .	
Linkage Areas (LINK)	
The following objective, standard, and guidelines apply to all projects within linkage areas in occupied habitat, subject to valid existing rights.	The project is not within a Linkage area. All items will remain unchanged regardless.
Objective LINK O1:	
In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges, or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.	
Standard LINK S1:	
When highway ¹⁸ or forest highway ¹² construction or reconstruction is proposed in linkage areas ²² , identify potential highway crossings.	
Guideline LINK G1:	
NFS lands should be retained in public ownership.	
Guideline LINK G2:	
Livestock grazing in shrub-steppe habitats ⁴³ should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages ²⁸ , similar to conditions that would have occurred under historic disturbance regimes.	
Required Monitoring	
Map the location and intensity of snow compacting activities and designated and groomed routes that occurred inside LAUs during the period of 1998 to 2000. The mapping is to be completed within one year of this decision, and changes in activities and routes are to be monitored every five years after the decision.	
When project decisions are signed report the following:	
1. Fuel treatments:	Yes.
a) Acres of fuel treatment in lynx habitat by forest and LAU, and whether the treatment is within or outside the WUI as defined by HFRA.	

b) Whether or not the fuel treatment met the vegetation standards or guidelines. If standard(s) are not met, report which standard(s) are not met why they were not met, and how many acres were affected.	
c) <i>Whether or not 2 adjacent LAUs exceed standard VEG S1 (30% in a stand initiation structural stage that is too short to provide winter snowshoe hare habitat), and what event(s) or action(s) caused the standard to be exceeded.</i>	
2. <i>Application of exception in Standard VEG S5</i>	No exemptions would be used.
a) <i>For areas where any of the exemptions 1 through 6 listed in Standard VEG S5 were applied: Report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.</i>	
3. <i>Application of exceptions in Standard VEG S6</i>	No exemptions would be used.
a) <i>For areas where any of the exemptions 1 through 3 listed in Standard VEG S6 were applied: Report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.</i>	
4. <i>Application of guidelines</i>	No deviations to guidelines considered.
a) <i>Document the rationale for deviations to guidelines. Summarize what guideline(s) was not followed and why.</i>	
Directions in <i>italics</i> were terms and conditions that were incorporated from the FWS Biological Opinion (USDI FWS 2007).	

INFISH Direction from the Forest Plan

Standard Widths Defining Interim RHCAs	Category 1- Fish-bearing streams: Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), whichever is greatest.	Yes. RHCAs were designated, and the vast majority of these areas were excluded from treatment. Less than 30 acres of treatment is proposed within the RHCAs of fish-bearing perennial streams.
	Category 2- Permanently flowing non-fish-bearing streams: Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year flood plain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet, including both sides of the stream channel), whichever is greatest.	Yes. RHCAs were designated, and the vast majority of these areas were excluded from treatment.
	Category 3- Ponds, lakes, reservoirs, and wetlands greater than 1 acre: Interim RHCAs consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond, or lake, whichever is greatest.	Yes. RHCAs were designated, and the vast majority of these areas were excluded from treatment.
	Category 4- Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide-prone areas: This category includes features with high variability in size and site-specific characteristics. At a minimum, the interim RHCAs must include:	Yes. RHCAs were designated, and the vast majority of these areas were excluded from treatment.
	Seasonally flowing or intermittent streams, wetlands less than one acre: This category includes features with high variability in size and site-specific characteristics. At a minimum, the RHCAs must include the area from the edges of the stream channel or wetland, to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greater. <i>(Note: The definition for this category has been slightly adjusted from INFISH, using a buffer of 100 feet for both priority and non-priority watersheds)</i> (Ref. FW-STD-RIP-03).	Yes. RHCAs were designated, and the vast majority of these areas were excluded from treatment.
	In non-forested rangeland ecosystems, the interim RHCA width for permanently flowing streams in categories 1 and 2 is the extent of the 100-year flood plain.	NA. No non-forested rangeland ecosystems present.

Standards and Guidelines	Description	
	Project and site-specific standards and guidelines listed below would apply to all RHCAs and to projects and activities in areas outside RHCAs that are identified through NEPA analysis as potentially degrading RHCAs. The combination of the standards and guidelines for RHCAs specified below with the standards and guidelines of existing forest plans and Land Use Plans would provide a benchmark for management actions that reflects increased sensitivities and a commitment to ecosystem management.	Yes. All treatment areas within perennial fish-bearing stream RHCAs would be field verified by a fisheries biologist to confirm consistency with all INFISH requirements.
	Under the strategy, the standards and guidelines listed below would be applied to the entire geographic area for the project. Due to the short-term duration of this interim direction, provisions for development and implementation of road/transportation management plans and the relocation, elimination, or reconstruction of existing roads, facilities, and other improvements (i.e., RF-2 c, RF-3 a and c, RF-4, RF-5, GM-2, RM-1, and MM-2) would be initiated but would be unlikely to be completed during the interim period. Where existing roads, facilities, and other improvements found to be causing an unacceptable risk cannot be relocated, eliminated, or reconstructed, those improvements would be closed. Also, due to the short-term duration of this direction, adjustments to management not within the sole discretion of the agencies (i.e., RF-1, LH-3, RA-1, WR-2, FW-3, and FW-4) would be initiated but would be unlikely to be completed during the interim period.	Yes. All S&Gs would be met project-wide.
Timber Management		
Standard (ref. FW-STD-RIP-03)	TM-1. Prohibit timber harvest, including fuelwood cutting, in RHCAs, except as described below	
	a) Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in RHCAs only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other Riparian Management Objectives (RMOs) and where adverse effects on inland native fish can be avoided. For priority watersheds, complete watershed analysis prior to salvage cutting in RHCAs.	Yes. All treatment areas within perennial fish-bearing stream RHCAs would be field verified by a fisheries biologist to confirm maintenance or improvement of all RMOs. This area represents less than 30 acres project-wide.

	b) Apply silvicultural practices for RHCAs to acquire desired vegetation characteristics where needed to attain RMOs. Apply silvicultural practices in a manner that does not retard attainment of RMOs and that avoids adverse effects on inland native fish.	Yes. All treatment areas within perennial fish-bearing stream RHCAs would be field verified by a fisheries biologist to confirm maintenance or improvement of all RMOs. This area represents less than 30 acres project-wide.
Roads Management		
Guideline (ref. FW-STD-RIP-03)	RF-1. Cooperate with federal, tribal, state, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain RMOs.	Yes. Considered during planning as applicable; no changes to use within the project area are proposed.
Guideline	RF-2. For each existing or planned road, meet the RMOs and avoid adverse effects on inland native fish by:	Yes. This was considered during the transportation analysis process and the assessment of risks/benefits associated with this project and proposed management activities.
	1) completing watershed analyses prior to construction of new roads or landings in RHCAs within priority watersheds.	
	2) minimizing road and landing locations in RHCAs.	
	3) initiating development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, address the following items in the plan:	
	a) Road design criteria, elements, and standards that govern construction and reconstruction.	
	b) Road management objectives for each road.	
	c) Criteria that govern road operation, maintenance, and management.	
	d) Requirements for pre-, during-, and post-storm inspections and maintenance.	
	e) Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.	
	f) Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control.	
	g) Mitigation plans for road failures.	
	4) avoiding sediment delivery to streams from the road surface.	
	a) Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is infeasible or unsafe.	

	b) Route road drainage away from potentially unstable stream channels, fills, and hillslopes.	
	5) avoiding disruption of natural hydrologic flow paths.	
	6) avoiding sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.	
Guideline	RF-3. Determine the influence of each road on the RMOs. Meet RMOs and avoid adverse effects on inland native fish by:	
	1) reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that retard attainment of RMOs, or do not protect priority watersheds from increased sedimentation.	Yes. All road construction maintenance would be designed to maintain or benefit RMOs. One crossing of a fish-bearing stream, McManus Creek, is expected to be improved by culvert replacement and bank stabilization.
	2) prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of RHCAs.	Yes. No new road construction within the RHCAs of fish-bearing streams. In the long-term, total project road work is expected to benefit RHCAs by reducing input of fine sediment.
	3) closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to listed inland native fish in priority watersheds, and the ecological value of the riparian resources affected.	Yes. About 2.7 miles of roads are proposed for maintenance followed by decommissioning, and 5.5 miles of existing system roads are proposed for decommissioning and removal from the system. Additionally, approximately 4.4 miles of new temporary roads would be decommissioned post-project.

Guideline	RF-4. Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bedload and debris, where those improvements would/pose a substantial risk to riparian conditions. Substantial risk improvements include those that do not meet design and operation maintenance criteria, or that have been shown to be less effective than designed for controlling erosion, or that retard attainment of RMOs, or that do not protect priority watersheds from increased sedimentation. Base priority for upgrading on risks in priority watersheds and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.	Yes. This would be integrated into site specific needs for road management activities proposed and estimated as part of the costs associated with the transportation needs within the project area.
Guideline	RF-5. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.	Yes. Instream work at one crossing of McManus Creek, a fish-bearing stream, is expected to improve fish passage by replacing culverts and stabilizing banks. Road work near all other crossings is expected to maintain existing passage.
Grazing Management		
Guideline	GM-1. Modify grazing practices (e.g., accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of RMOs or are likely to adversely affect inland native fish. Suspend grazing if adjusting practices is not effective in meeting RMOs.	Not applicable.
Guideline	GM-2. Locate new livestock handling and/or management facilities outside of RHCAs. For existing livestock handling facilities inside the RHCAs, assure that facilities do not prevent attainment of RMOs. Relocate or close facilities where these objectives cannot be met.	Not applicable.
Guideline	GM-3. Limit livestock trailing, bedding, salting, loading, watering, and other handling efforts to those areas and times that would not retard or prevent attainment of RMOs or adversely affect inland native fish.	Not applicable.
Guideline	GM-4. Adjust wild horse and burro management to avoid impacts that prevent attainment of RMOs or adversely affect inland native fish.	Not applicable.
	Recreation Management	

Guideline	RM-1. Design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent attainment of the RMOs and avoids adverse effects on inland native fish. Complete watershed analysis prior to construction of new recreation facilities in RHCAs within priority watersheds. For existing recreation facilities inside RHCAs, assure that the facilities or use of the facilities would not prevent attainment of RMOs or adversely affect inland native fish. Relocate or close recreation facilities where RMOs cannot be met or adverse effects on inland native fish cannot be avoided.	Not applicable.
Guideline	RM-2. Adjust dispersed and developed recreation practices that retard or prevent attainment of RMOs or adversely affect inland native fish. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective in meeting RMOs and avoiding adverse effects on inland native fish, eliminate the practice or occupancy.	Not applicable.
Guideline	RM-3. Address attainment of RMOs and potential effect on inland native fish in Wild and Scenic Rivers, Wilderness, and other Recreation Management plans.	Not applicable.
Minerals Management		
Guideline	MM-1. Minimize adverse effects to inland native fish species from mineral operations. If the Notice of Intent indicates a mineral operation would be located in a RHCAs, consider the effects of the activity on inland native fish in the determination of significant surface disturbance pursuant to 36 CFR 228.4. For operations in a RHCA ensure operators take all practicable measures to maintain, protect, and rehabilitate fish and wildlife habitat which may be affected by the operations. When bonding is required, consider (in the estimation of bond amount) the cost of stabilizing, rehabilitating, and reclaiming the area of operations.	Not applicable.
Guideline	MM-2. Locate structures, support facilities, and roads outside RHCAs. Where no alternative to siting facilities in RHCAs exists, locate and construct the facilities in ways that avoid impacts to RHCAs and streams adverse effects on inland native fish. Where no alternative to road construction exists, keep roads to the minimum necessary for the approved mineral activity. Close, obliterate and revegetate roads no longer required for mineral or land management activities.	Not applicable.

Standard	MM-3. Prohibit solid and sanitary waste facilities in RHCAs. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in RHCAs exists, and releases can be prevented and stability can be ensured, then:	Not applicable.
	1) analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics;	Not applicable.
	2) locate and design the waste facilities using the best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in RHCA;	Not applicable.
	3) monitor waste and waste facilities to confirm predictions of chemical and physical stability, and make adjustments to operations as needed to avoid adverse effects to inland native fish and to attain RMOs;	Not applicable.
	4) reclaim and monitor waste facilities to assure chemical and physical stability and revegetation to avoid adverse effects to inland native fish and to attain the RMOs; and	Not applicable.
	5) require reclamation bonds adequate to ensure long-term chemical or physical stability and successful revegetation of mine waste facilities.	Not applicable.
Standard	MM-4. For leasable minerals, prohibit surface occupancy within RHCAs for oil, gas, and geothermal exploration and development activities where contracts and leases do not already exist, unless there are no other options for location and RMOs can be attained and adverse effects to inland native fish can be avoided. Adjust the operating plans of existing contracts to (1) eliminate impacts that prevent attainment of RMOs and (2) avoid adverse effects to inland native fish.	Not applicable.
Standard	MM-5. Permit sand and gravel mining and extraction within RHCAs only if no alternatives exist, if the action(s) would not retard or prevent attainment of RMOs, and adverse effects to inland native fish can be avoided.	Not applicable.
Guideline	MM-6. Develop inspection, monitoring, and reporting requirements for mineral activities. Evaluate and apply the results of inspection and monitoring to modify mineral plans, leases, or permits as needed to eliminate impacts that prevent attainment of RMOs and avoid adverse effects on inland native fish.	Not applicable.
Fire/Fuels Management		

Guideline	FM-1. Design fuel treatment and fire suppression strategies, practices, and actions so as not to prevent attainment of RMOs, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could perpetuate or be damaging to long-term ecosystem function or inland native fish.	Yes. All fuel treatments within perennial fish-bearing stream RHCAs would be field verified by a fisheries biologist to confirm maintenance or improvement of all RMOs. This area represents less than 30 acres project-wide.
Guideline	FM-2. Locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of RHCAs. If the only suitable location for such activities is within the RHCAs, an exemption may be granted following a review and recommendation by a resource advisor. The advisor would prescribe the location, use conditions, and rehabilitation requirements, with avoidance of adverse effects to inland native fish a primary goal. Use an interdisciplinary team, including a fishery biologist, to predetermine incident base and helibase locations during pre-suppression planning.	Not applicable.
Guideline	FM-3. Avoid delivery of chemical retardant, foam, or additives to surface waters. An exception may be warranted in situations where overriding immediate safety imperatives exist; or, following a review and recommendation by a resource advisor and a fishery biologist when the action agency determines an escape fire would cause more long-term damage to fish habitats than chemical delivery to surface waters.	Not applicable.
Guideline	FM-4. Design prescribed burn projects and prescriptions to contribute to the attainment of the RMOs.	Yes. All fuel treatments within perennial fish-bearing stream RHCAs would be field verified by a fisheries biologist to confirm maintenance or improvement of all RMOs. This area represents less than 30 acres project-wide.
Guideline	FM-5. Immediately establish an emergency team to develop a rehabilitation treatment plan to attain RMOs and avoid adverse effects on inland native fish whenever RHCAs are significantly damaged by a wildfire or a prescribed fire burning out of prescription.	Yes. If project fire treatment burns out of prescription this requirement will be met.
Lands		

Guideline	LH-1. Require instream flows and habitat conditions for hydroelectric and other surface water development proposals that maintain or restore riparian resources, favorable channel conditions, and fish passage, reproduction, and growth. Coordinate this process with the appropriate state agencies. During relicensing of hydroelectric projects, provide written and timely license conditions to the Federal Energy Regulatory Commission (FERC) that require fish passage and flows and habitat conditions that maintain/restore riparian resources and channel integrity. Coordinate relicensing projects with the appropriate state agencies.	Not applicable.
Guideline	LH-2. Locate new hydroelectric ancillary facilities outside RHCAs. For existing ancillary facilities inside the RHCAs that are essential to proper management, provide recommendations to FERC to assure that the facilities will not prevent attainment of the RMOs and that adverse effects on inland native fish are avoided. Where these objectives cannot be met, provide recommendations to FERC that such ancillary facilities should be relocated. Locate, operate, and maintain hydroelectric facilities that must be located in RHCAs to avoid effects that would retard or prevent attainment of the RMOs and avoid adverse effects on inland native fish.	Not applicable.
Guideline	LH-3. Issue leases, permits, rights-of-way, and easements to avoid effects that would retard or prevent attainment of the RMOs and avoid adverse effects on inland native fish. Where the authority to do so was retained, adjust existing leases, permits, rights-of-way, and easements to eliminate effects that would retard or prevent attainment of the RMOs or adversely affect inland native fish. If adjustments are not effective, eliminate the activity. Where the authority to adjust was not retained, negotiate to make changes in existing leases, permits, rights-of-way, and easements to eliminate effects that would prevent attainment of the RMOs or adversely affect inland native fish. Priority for modifying existing leases, permits, rights-of-way, and easements would be based on the current and potential adverse effects on inland native fish and the ecological value of the riparian resources affected.	Not applicable.
Guideline	LH-4. Use land acquisition, exchange, and conservation easements to meet RMOs and facilitate restoration of fish stocks and other species at risk of extinction.	Not applicable.
General Riparian Area Management		
Guideline	RA-1. Identify and cooperate with federal, tribal, state and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.	

Guideline	RA-2. Trees may be felled in RHCAs when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.	Yes. All treatment areas within perennial fish-bearing stream RHCAs would be field verified by a fisheries biologist to confirm maintenance or improvement of all RMOs, including large woody debris.
Guideline	RA-3. Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of RMOs and avoids adverse effects on inland native fish.	Not applicable.
Standard	RA-4. Prohibit storage of fuels and other toxicants within RHCAs. Prohibit refueling within RHCAs unless there are no other alternatives. Refueling sites within RHCAs must be approved by the Forest Service or Bureau of Land Management and have an approved spill containment plan.	Yes. This standard would be applied project-wide.
Guideline	RA-5. Locate water drafting sites to avoid adverse effects to inland native fish and instream flows, and in a manner that does not retard or prevent attainment of RMOs.	Yes. This guideline would be applied project-wide.
	Watershed and Habitat Restoration	
Guideline	WR-1. Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and contributes to attainment of RMOs.	Not applicable.
Guideline	WR-2. Cooperate with federal, state, local, and tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPS) or other cooperative agreements to meet RMOs.	Not applicable.
Fisheries and Wildlife Restoration		

Guideline	FW-1. Design and implement fish and wildlife habitat restoration and enhance actions in a manner that contributes to attainment of the RMOs.	Restoration of the McMannus Road/Stream crossing following completion of proposed management activities will incorporate necessary coordination of hydrology and engineering designs as necessary. The analysis supports that post-project sediment reduction is expected to enhance fish habitat and improve sediment-related RMOs.
Guideline	FW-2. Design, construct, and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of the RMOs or adversely affect inland native fish. For existing fish and wildlife interpretive and other user-enhancement facilities inside RHCAs assure that RMOs are met and adverse effects on inland native fish are avoided. Where RMOs cannot be met or adverse effects on inland native fish avoided, relocate or close such facilities.	Not applicable.
Guideline	FW-3. Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that prevent attainment of RMOs or adversely affect inland native fish.	Not applicable.
Guideline	FW-4. Cooperate with federal, tribal, and state fish management agencies to identify and eliminate adverse effects on inland native fish associated with habitat manipulation, fish stocking, fish harvest, and poaching.	Not applicable.

Project specific design features

These are specific project design measure to ensure compliance with Forest Plan direction, as well as applicable laws, regulations, and policy.

	Resource	Where to apply
	Scenic Quality and Aesthetics	
CM_DF-1	Treatment units should avoid symmetrical shapes, straight lines and angles, disproportionate (to surrounding untreated units) opening and cluster sizes, and artificial lines and patterns. Additionally treatments should follow natural topographic breaks and changes in vegetation, treat the entire landform and along roadways vary unit sizes, widths, shapes and distances from center lines as much as possible.	Units 4-20, 30, 41, 42, 56, 62A-D, 66, and 70
CM_DF-2	In created openings, use irregular shaped openings with grouped leave tree islands to reduce visual contrast to untreated areas. Feather edges to minimize introducing straight lines or corners within treatment units and between treated untreated areas. Use irregular clumping and blending of unit edges to avoid introducing dominating lines that could result from creating small patch openings. Mimic natural density changes around created openings and retain the natural variances within the stand rather than evening out the spacing of trees. The intent is to reduce the obvious character changes occurring in the overall landscape.	Units 7, 9, 10, 11, 12, 13, 14, 15, 17, 19, 41, 56, 66, 70
CM_DF-3	To the extent possible, keep corridors as narrow as possible to reduce contrasting liner effects. Use irregular clumping to create mosaic scenic character on edges of corridors, use open areas adjacent to corridors. Minimize the number of skyline corridors. Align corridors to avoid them being directly perpendicular to viewing platform so they are less visible. Select skyline systems with lateral yarding capabilities if possible.	Units 5, 6, 12, 13, 16, 20, 49, 56
CM_DF-4	In units adjacent to untreated areas, especially where change in ownership is also at the edge, use irregular clumping and blending of unit edges to avoid introducing dominating lines and edges. Use one or more of the techniques as follows to reduce this possibility: <ul style="list-style-type: none"> • Provide a transition zone along the unit's edges. Progressively increase leave tree density from the unit center towards the unit edge where uncut canopy exists. If there are existing openings in the uncut area adjacent, do not increase tree density; link the existing opening to the created opening • Special marking based thinning at the edges with variable spacing of leave trees, clumping of a variety of tree sizes and species if possible to create a mosaic texture. • Vary the height and age of leave trees along the edge to reduce a homogenous vertical wall effect. 	Units 4, 14, 15, 17, 18, 19, 20, 41, 56, 66

	<ul style="list-style-type: none"> Vary the edge vertically up-down slope to reduce linear pattern creation at the edge of the unit. 	
CM_DF-5	Use existing topography, roads and other existing natural barriers as fire lines for burning to the extent possible (technically and economically). If new line must be built tie into existing barriers to reduce edge effects, linear features and color contrast. On the south-facing slope towards Interstate 90 avoid vertical lines to meet the retention Visual Quality Objectives.	All burn units
CM_DF-6	Maintain the existing vegetation below constructed and temporary roads as much as possible to help blend mosaic scenic character along the roads. Where feasible, retain screening trees one tree-height below roads and landings (include cable landings) when viewed from below. Any major changes during implementation in the temporary road locations from the mapped proposed action would need to be verified by the landscape architect or designee to ensure that scenic integrity is maintained.	All roads constructed or reconstructed on south face of project area; facing Interstate 90; Focus on retaining any vegetation downslope of the road that can be retained in Units 7, 9, 10 and 11 where the road is likely to be the most visible.
CM_DF-7	If changes are proposed to units visible from concern level 1 travel ways or locations, consult Forest Landscape Architect or designee on design feature changes to address potential scenery concerns.	South-facing portion of the project area with views to Interstate 90 and Milwaukee Grade Trail.
	Weeds Management	
CM_DF-8	Clean off-road equipment (power or high pressure cleaning) of all mud, dirt, and plant parts before moving into the area. (<i>Standard Operating Procedures</i>)	All Road Management Activities
CM_DF-9	Roads would be treated prior to any road activity including but not limited to road construction, reconstruction, maintenance, and haul unless existing road conditions (i.e. vegetation on road, road barriers, etc.) prohibit reasonable access for spraying equipment. Reasonable access would be determined by the District Weed Coordinator. If existing road conditions prohibit access, then treatment would be deferred until the road activities clear the obstruction. (<i>FS personnel</i>)	
CM_DF-10	If gravel or other material is hauled for road surfacing, it would be from a site (pit) that has been previously treated for weeds and is currently weed free, where possible. (<i>Standard Operating Procedures</i>)	
CM_DF-11	Seed disturbed sites with native seed mixtures or appropriate Lolo seed mixtures. (<i>Standard Operating Procedures</i>)	

CM_DF-12	Straw used for road stabilization and erosion control would be certified weed-free or weed seed-free. <i>(Standard Operating Procedures)</i>	
CM_DF-13	Clean off-road equipment (power or high pressure cleaning) of all mud, dirt, and plant parts before moving into the area. <i>(Standard Operating Procedures)</i>	All mechanical vegetation management activities
CM_DF-14	Where possible, before and during sale prep., locate and spray, if needed, possible landing sites. Note to sale administrator, where possible, approve skid trails, skyline corridors and landing locations where there are no obvious standing weed infestations. <i>(FS personnel)</i>	
CM_DF-15	Temporary roads would be treated with herbicide prior to final road obliteration unless waived by agreement. <i>(Standard Operating Procedures)</i>	
CM_DF-16	Regeneration units on the south face of Cruzane Mountain where St. Johnswort populations are highest would be planted with native trees to expedite the establishment of tree canopy cover in these units. <i>(FS and/or contract personnel)</i>	
CM_DF-17	At the discretion of the Contracting Officer, all equipment, vehicles, and trailers of the planting contractor shall be free of all dirt, plant parts, and material that may carry noxious weeds. <i>(Standard Operating Procedures)</i>	Reforestation following regeneration harvests
	Soils	
CM_DF-18	The standard dry-ground Equipment Operation Period is June 15 to Sept 15, but may extend beyond as long as dry conditions exist. Dry conditions (as shown in Soils Report Appendix B) must exist on greater than 85% of the harvest unit (including the landings)	Harvest Operations
CM_DF-19	Field observations to determine if soils are sufficiently dry for equipment to operate are: <ul style="list-style-type: none"> • If the soil forms a clod from the upper 6 inches of soil, it is too wet to work OR • As displayed in Appendix B in the Soils Report. 	
CM_DF-20	Skid trails would generally be designated 75 feet apart with consideration given to the unit and equipment/operator capabilities.	
CM_DF-21	Dispersed skidding may be used depending on the amount of material to be removed, shape of the unit, and equipment to be used. Designate skid trails where machine traffic would be high, <i>for example</i> , close to landings.	
CM_DF-22	Sale administrator would be given the flexibility to disperse or designate skid trails based on site-specific conditions with consultation by an FS Soil Scientist, with the objective of meeting Region 1 Soil Quality Standards.	
CM_DF-23	Units 23, 44, 45 and 47 are designated for demonstrations of tethered harvest operations, or skyline. Tethered yarding system has been included to provide flexibility for harvest on slopes at	

	upper limits for operations. Ongoing research performed in Region 6 (Sessions et al. 2017) indicates tethered harvest may be effective at reducing harvest-related soil disturbance. These units will require monitoring during implementation. If higher than expected levels of disturbance are found during implementation, the remainder of units will be treated using skyline only.	
CM_DF-24	Where feasible, existing road prisms, skid trails and landings as well as other areas of disturbance will be favored over creating new areas of disturbance.	
CM_DF-25	Stationary skid turns and side-slope movement of harvest and skidding equipment between designated trails would be minimized.	
CM_DF-26	Harvest and skidding equipment would be restricted from operating in areas with greater than 35% average slope except for short pitches (40-45% and less than 100 feet in length), unless the site is reviewed by an FS Soil Scientist.	
CM_DF-27	A no-equipment buffer is to be placed around all ephemeral draws. The no-equipment buffer is 50 feet from the draw centerline or the top of the inner gorge. Trees can be felled to lead or lined out of the draw as long as gouging of the soil surface does not occur. Equipment may cross the ephemeral draw at designated crossings.	
CM_DF-28	Newly constructed temporary roads and landings will be obliterated upon completion of mechanical operations. Obliterating temporary roads will consist of re-contouring the road prism, including all cut and fill slopes. Logging slash, stumps, and woody debris will be placed on top of obliterated road corridors to effectively prevent illicit vehicle travel. Where re-contouring is unnecessary, or where detrimental soil disturbance has occurred on skid trails, scarify traveled surface to a depth sufficient to ameliorate the presence of detrimental soil compaction (usually between 2 and 12 inches).	
CM_DF-29	Disturbed sites, such as temporary road corridors, landings and skid trails with high levels of disturbance will be revegetated using seed recommended by the Forest Botanist as soon as feasible after the completion of operations to prevent the spread of noxious weeds.	
CM_DF-30	Slash is to be placed on areas of bare mineral soil within the main skid trails for protection of exposed soil.	Skid Trails and Temporary Roads
CM_DF-31	Duff, litter, soil, and woody material that is displaced from the trail will be placed back over the skid trail.	
CM_DF-32	Slash and coarse woody debris (both greater than and less than 3" in size) would be placed over 65-70% of the skid trail in contact with the soil surface.	
CM_DF-33	To mitigate risk of soil erosion associated with exposed forest soils following burning, small diameter slash can be used to cover forest floor openings greater than 100 square feet where high soil burn severity may result in vulnerable soil conditions.	Prescribed fire - where high soil burn severity results in exposed forest soils in

		openings greater than 100 square feet.
	Wildlife	
CM_DF-34	Each road in the project area used for log haul or management activities shall be returned to its pre-project status of closure/drivability. Thus roads with berms or entrance obliterations should be returned to that condition upon completion of project activities. Gated roads should be remain gated with same travel management as before the project.	All road management activities
CM_DF-35	Temporary roads shall be decommissioned upon closure of the timber sale contract.	Temporary Roads
CM_DF-36	Prescribed burning within the south subunit should be completed outside of the Elk Calving period of May 1st to July 1st	Prescribed burning activities within the south subunit, including LS2.
	Prescribed Fire	
CM_DF-37	Best Available Control Technology: As per the Forest Service Open burning permit with the State of Montana, Best Available Control Technology will be used to limit impacts from burning operations. This includes submitting and obtaining burn approval from the MT/ID Airshed Group prior to ignition, and burning only during times of at least good ventilation.	Prior to or during prescribed burning activities – EMB, under burning, or grappling and piling burns for fuels management and site preparation.
CM_DF-38	Public Notification: All residents within the burn area will be personally notified prior to any prescribed burning. Signs will also be posted as needed along roads warning of potential visibility impairment from smoke. Media and Facebook releases may also occur.	
CM_DF-39	Splitting Burn Blocks: Larger burn blocks may be burned over multiple days in order to reduce the short term smoke impacts. For pile burning, short term impacts may be lessened by reducing the number of piles burned.	
CM_DF-40	Refined Smoke Modeling: The First Order Fire Effects Model 6.5 was used to determine PM _{2.5} and PM ₁₀ levels for pre and post treatment conditions. The model calculated the amount of PM _{2.5} and PM ₁₀ emissions that would result from a wildfire in its natural state, emissions from prescribed burning from treatment, and a wildfire in its natural state in post treatment conditions.	
CM_DF-41	Mop Up: If any prescribed burn appears to be generating nuisance smoke for days after ignition is complete, those areas may be extinguished.	
	Hydrology and Aquatics	
CM_DF-42	A forest hydrologist or soil scientist will need to visit these units to evaluate stability and complete any necessary wetland delineation needs. Any wetland areas would be buffered as	Unit 18 and 19

	necessary per INFISH requirements for Category 3 or 4 wetlands to ensure compliance and also to ensure there is no risk of mass wasting due to continual wetness in areas of steeper slopes. Feasibility to harvest these units will be reconsidered after completion of these field reviews and coordination with Silviculture/Timber Management or Sale Administrator and the District Ranger.	
CM_DF-43	Prior to implementation all RHCA portions of applicable units will be field verified by an interdisciplinary team, including a fisheries biologist. Site-specific treatment will be designed to ensure compliance with INFISH, including maintenance or improvement of all Riparian Management Objectives (e.g., large woody debris, sediment input, stream temperature).	Commercial Thin Units 60, 63, Pre-commercial Thin Unit 69, Regeneration Harvest Units 66 and 67, FB1 and 2.
CM_DF-44	Ensure that National Core Best Management Practices are integrated into all project activities to minimize impacts to soils and watershed resources.	All project activities
	Heritage and Cultural Resources	
CM_DF-45	Additional cultural sites may be located during implementation, and following standard protocols, the Timber Administrator will inform the archaeologist as soon as possible for further investigation.	All project activities
CM_DF-46	Lolo NF Heritage Program staff would flag any cultural resources known sites to be avoided prior to mechanical and/or hand treatment and would recommend standard operating procedures and/or some protection measures to ensure those implementing the project will avoid accidental damage to the site, i.e. a piece of equipment driving through one area to get to another and could accidentally drive over a site.	A document with specific location will be written and given to the Timber Sale Administrator and to the Silviculturalist that will be protected as a sensitive document, censored from the Freedom of Information Act (FOIA).

Monitoring requirements

	Noxious Weeds Management
CRMON-1	Monitor for the presence of new weed infestations within the harvest treatment areas in conjunction with other future monitoring and/or inventory activities. <i>(FS personnel)</i>
CRMON-2	Roads treated would be monitored for herbicide efficiency, the presence of a new noxious weed or the spread of an existing

	noxious weed in conjunction with other subsequent activities in the area. <i>(FS personnel)</i>
	Detrimental Soil Disturbance
CRMN-3	Post-activity project monitoring is conducted using the R1 Forest Soil Disturbance Monitoring Protocol (Dumroese et al. 2009) on a random subset of project activity units. Post-activity monitoring is initiated 2-3 years following an activity to access soil recovery. Soil monitoring on the Lolo National Forest is based on the 15% detrimental soil disturbance threshold in compliance with R1 Soil Quality Standards (USDA R1 Supplement 2500-1, 2014).
CRMN-4	Region 1 Soil Quality standards stipulate that management activities must not exceed 15 percent areal disturbance as a result of project implementation. Ideally, the planned activity should move conditions towards a net improvement in soil quality. If the 15 percent threshold for disturbance is reached, corrective actions are taken to rehabilitate the impacted site. In the Cruzane Mountain project area, commercial activity units will be randomly chosen for post-harvest monitoring.
CRMN-5	Units that will require monitoring during implementation for the Cruzane Mountain project are 23, 44, 45 and 47, which are designated for skyline/tethered harvest. This is an option that has been included for yarding systems to provide flexibility for harvest on slopes towards upper operating limits that has been shown to reduce soil disturbance. If higher than expected levels of disturbance are found during implementation, the remainder of skyline/tethered units will be treated with skyline only.
	Prescribed Fire Activities
CRMN-6	All prescribed burns will be actively monitored visually. If any prescribed burn appears to be generating too much smoke, measures will be taken to shut down burning operations. In addition, smoke monitors can be placed in populated areas to measure public exposure to smoke.
	Heritage and Cultural Resources
CRMN-7	Heritage monitoring is necessary in the Cruzane Mountain prior to project implementation as well as afterwards to assess site condition. Lolo NF Heritage Program staff will flag any cultural resources to be avoided prior to mechanical and/or hand treatment. Following implementation, Heritage Staff will visit the area to ensure site damage has not occurred.